FEBRUARY, 1955

PIPE LINE INDUSTRY

Gulf Publishing Company

CONSTRUCTION • OPERATIONS • MAINTENANCE

The Bay of Bombay

Where an American construction crew found that 'time and tide wait for no man' . . . not even pipeliners.

Page 40

Hot Tap Techniques

How they have evolved from crude and dangerous operations to a science with almost unlimited possibilities.

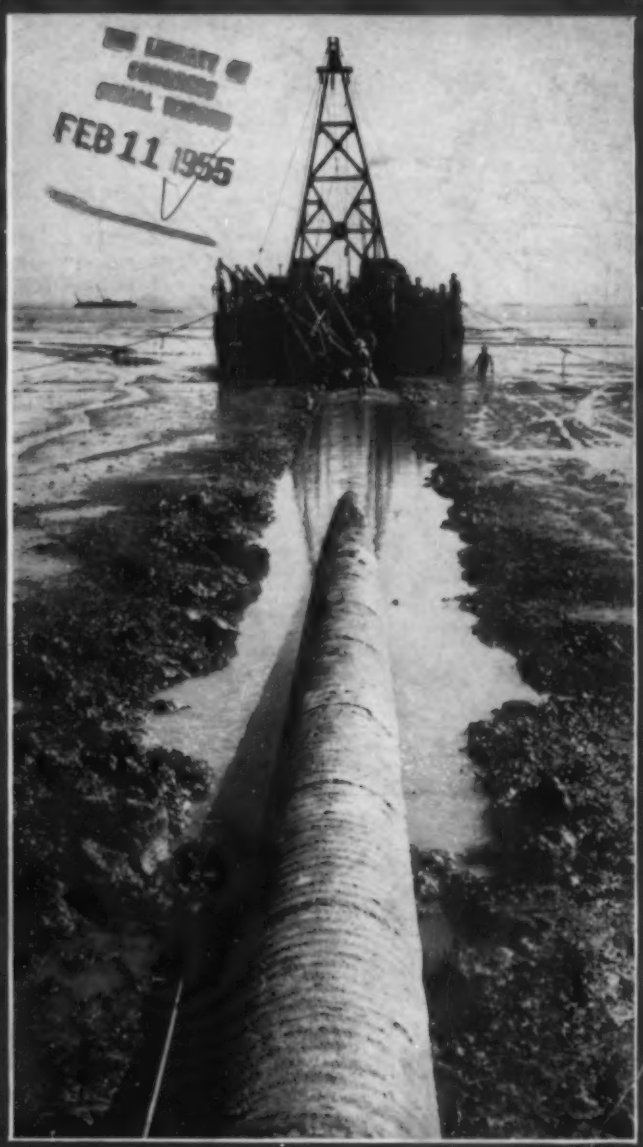
Page 48

Atmospheric Coolers

Here are some correlations based on 30 tests that will help you predict what kind of heat transfer can be expected.

Page 56

Turn page for additional contents and a Quick Review of this issue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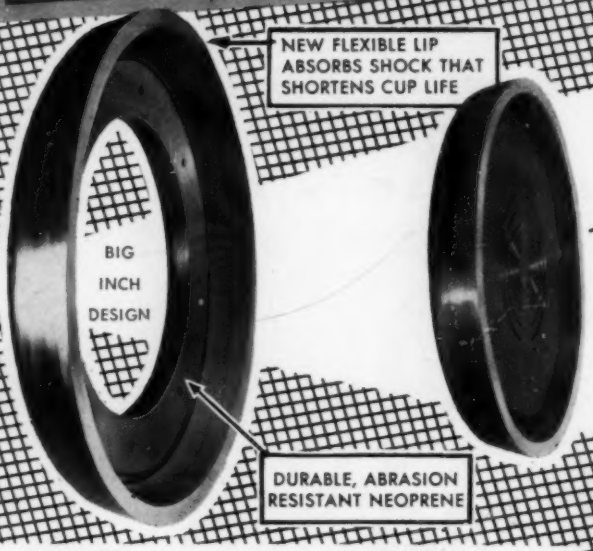
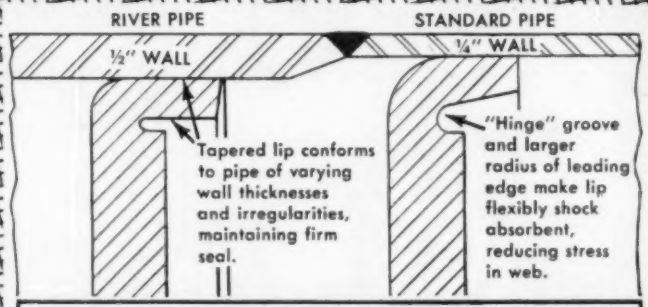
Single copy price 50 cents

Announcing the WmSEAL WEAR COMPENSATING PIPE-LINE SCRAPER CUP



SPRING-LIKE ACTION OF CUP LIP IS . . . WEAR COMPENSATING

. . . Designed and developed by the joint efforts of Williamson and Gates Engineers to give longer and better service.


RIVER PIPE
½" WALL
STANDARD PIPE
¼" WALL
Tapered lip conforms to pipe of varying wall thicknesses and irregularities, maintaining firm seal.
"Hinge" groove and larger radius of leading edge make lip flexibly shock absorbent, reducing stress in web.

CONFORMS TO PIPE OF VARYING WALL THICKNESS

WmSEAL SCRAPER CUPS designed for all WmSON pigs, will also fit other scrapers, etc.

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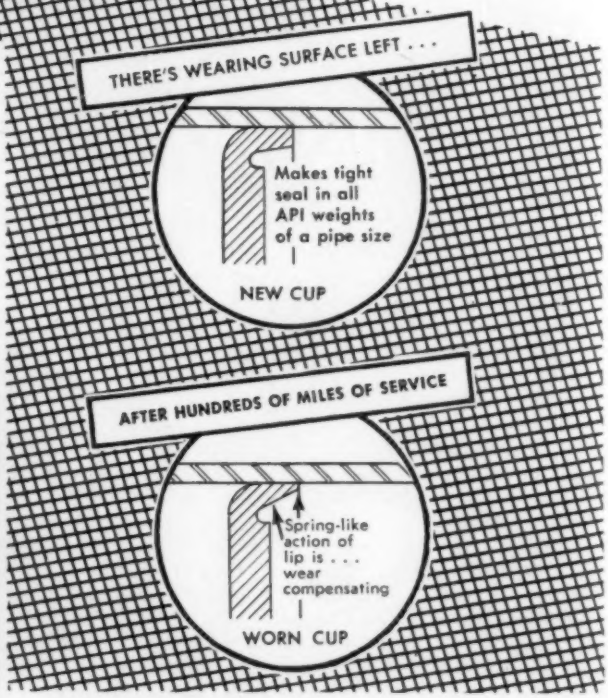
THERE'S WEARING SURFACE LEFT . . .
Makes tight seal in all API weights of a pipe size
NEW CUP
AFTER HUNDREDS OF MILES OF SERVICE
Spring-like action of lip is . . . wear compensating
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PIPE LINE INDUSTRY

CONTENTS and Quick Review

FEB - 8 195

February, 1955 Vol. 2, No. 2

To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.

3 Ways to Shed the Detail Problem

☐ Lighten your burden of the routine. Every executive has available to him three means by which he can do this. Don't miss these money-saving ideas.

By Auren Uris.....Page 38

Pipeline in the Bay of Bombay

☐ Laying 90,000 feet of pipe in the tide-swept Bay of Bombay taxed the experience of Collins Construction Company crews to the utmost. Another story of pipe line progress told in pictures.

Page 40

Largest Gas-Fired Compressor Station

☐ The world's largest centrifugal compressor plant was erected on pile-supported platform in Lake Maracaibo, Venezuela. It has ten 6000-horsepower gas-fired turbines and can handle approximately 154 million cubic feet of gas per day, 17 million of which goes for fuel and condensates. Suction pressure is 10 psig; discharge pressure 1935 psig.

Page 46

Hot Tapping Comes of Age

☐ Big inch high-pressure hot taps are safer today than the small diameter hot taps of just a few years back. This offers many advantages to pipe line companies which can often realize tremendous savings with a hot tap.

By James H. McBrien.....Page 48

Motor Grader Speeds Reconditioning

☐ Using a motor patrol grader for uncovering a pipe line to be reconditioned and later using the same machine for backfilling saved time and money for the Pipe Line department of Utah Oil Refining Company.

By Dale W. Mosier.....Page 54

How to Design Atmospheric Coolers

☐ If you have atmospheric coolers in your plant, here are some correlations that will tell you what kind of heat transfer you can expect. The authors also have made tests on pressure drops on such units and have come up with a generalized correlation.

By Donald L. Katz, Edwin H. Young, Richard B. Williams and Garen Balekjian.....Page 56

Engine Cylinder Balance

☐ Gas engines must be "in balance" if they are to perform with optimum efficiency. Here is some important information on when and how to achieve true cylinder balance in 2 and 4 cycle, low and high compression engines.

By James H. Caldwell.....Page 60

Safety Man Gets There First

☐ H. C. Price Company safety engineers arrive on a job well ahead of the construction crews. These safety engineers are assigned certain preliminary duties to perform which to a large extent account for the company's low accident frequency rate.

By Anthony Gibbon.....Page 63

Speed Up Gas Purchase Accounting

☐ Purchase settlements for natural gas can become very complicated when you operate 20 natural gasoline plants and there are approximately 3000 leases supplying gas through 3000 meters to these plants. This was the problem faced by Warren Petroleum Corporation.

By P. A. Brockwell.....Page 64

Don't Waste Employe Talent

☐ Chances are high that of 100 employes selected at random at least three could qualify for promotion. Where there has been no organized plan of selection, the figure would be much higher.

By Eugene J. Benge.....Page 68

'Salesmen Who Get My Business'

☐ A purchasing agent describes the salesmen he favors and tells why. Here's a chance to listen in on a successful sales 'pitch.'

By Joe A. Huitt.....Page 78

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Anybody seen this man?

We're looking for a certain fellow on the sunny side of 35. You'd consider him a personable sort, though he doesn't display his dentures at the drop of pun. He's got a lively curiosity, likes to travel, and he likes people. He went to college . . . studied petroleum or mechanical engineering . . . but he didn't stay there so long he became a campus institution. He has a nodding acquaintance with a typewriter. Not necessarily a polished writer, you understand. Just a fellow who can put one little word after another and come up with something a pipeliner will like to read.

Have you seen this fellow? Well, if you happen to run across him, tell him to get in touch with Warren Baker, the foreman on this spread. Warren wants to offer him a job. The complete name and address is Warren L. Baker, Editorial Director, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1.

PIPE LINE INDUSTRY published every month. Entered as second class mail matter July 9, 1954, at the post office at Houston, Texas, under the act of March 3, 1879.

Death Notice for Free Enterprise

Many important questions confront the new Congress of the United States. In wrestling with these matters, it is to be hoped that Congress does not overlook the question of government control of natural gas prices. This also is extremely important. While obviously an exceedingly important problem for the oil and gas industry, actually the basic principles involved make it a matter of great concern to every American citizen.

Basically the issue involves this country's system of government and business enterprise as known since the beginning of the U. S. The outcome will constitute one of the most historic constitutional questions in American history. Therefore it will affect a great many businesses and every American citizen.

It is urgent that action be taken at this session of Congress, because of the recent imposition by the U. S. Supreme Court of federal government price regulation over natural gas sold by producers to interstate pipe line companies.

•

Truly frightening implications arise from imposition of government control of prices received by natural gas producers.

If gas prices are to be government-controlled, the way has been paved for the regulation of producers' prices on all commodities. Every basic product in existence enters interstate commerce. It logically follows that the producers' prices for wheat, corn, cotton, coal, copper, steel and other basic commodities also are likely to be regulated.

The natural gas business is no different from the pattern of most other commodities. Producers produce and gather the gas for sale to transmission companies. The latter ship the gas cross-country and wholesale it to local distributors, who retail it to the customers. Ranchers are the producers of cattle. They raise the cattle, gather them, and sell them to packing houses. Packers process them and wholesale the meat to stores which retail it to consumers.

Even if government regulation is limited to things used by public utilities, the next step would be to regulate the price of large quantities of coal and oil used in generating electricity. For that matter, why shouldn't everything a utility uses be subject to the same regulation, whether wire, generators, automobiles, typewriters or what-have-you?

•

A sweeping change thus is indicated in the relationship between U. S. business and government.

Government control of producers' prices would be a long, long step in the direction of Socialism. This would mark the approaching end of the American free enterprise business system unless corrected at once.

There is no basis for departing from America's long-established successful competitive system—unless the people of this country want to replace American tradition and philosophy with Socialism.

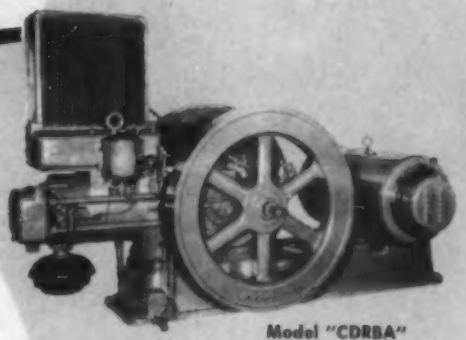
The American people must decide now between two philosophies: whether they (1) want to adopt Socialism or (2) want to preserve and perpetuate the American way of life for coming generations.

The only sure way to remedy the situation is for the American people to see that Congress passes corrective legislation that will prevent the first step toward Socialism from becoming effective.

Warren L. Baker

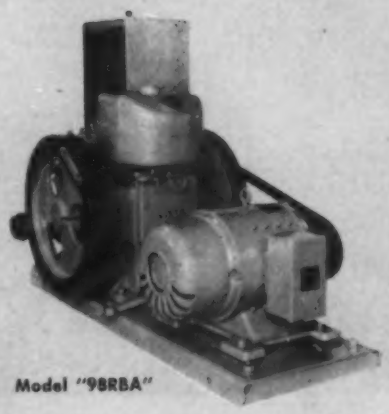
small, portable . . .
Electric Generator Units
by WITTE

ARE WELL SUITED FOR CATHODIC INSTALLATIONS



Model "CDRBA"

Model "ADRDA"



Model "98RBA"

• Witte Power Units, successful in oilfield operations everywhere, are now teamed with electric generator units to provide cathodic protection as well as communication for pipe lines. Their compactness makes transportation and installation easy and economical. And being of suitable size, these units can be "spotted" to take care of individual corrosive areas as needed. Weatherproof engines and generators make it possible for the units to operate out of doors with the simplest kind of protection.

Witte engine-generator units are designed for automatic continuous 24-hour-a-day operation and can be equipped to run on gas, gasoline, or diesel fuel with minimum maintenance. Replacement of cylinder liners, valve seats, etc., can be easily and economically done in the field.

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Model	Engine rpm	Engine hp	Generator rpm	KW Range
"98RBA"	1,200	9	1,800	5.4
"ADRDA"	1,200	3.8	1,200	2.4
"LDRBA"	1,350	8.6	1,800	5.4
"BDRBA"	900	7.8	1,800	4.9
"CDRBA"	750	12.2	1,800	7.7

RATINGS BASED ON 24-HOUR-A-DAY OPERATION.

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Full diesel — Models from 3.75 to 12.5 hp.

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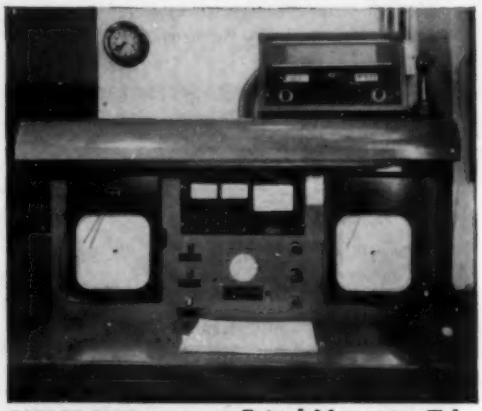
Nobody here but us instruments!

• Bristol Metameter Telemeters continuously record suction and discharge pressures and kilowatt hours used by electric motors at Sunray Oil Corporation's completely unattended, radio-controlled pumping station in Pernell, Oklahoma. Readings are transmitted by microwave radio from this and another Bristol-equipped booster station at Ada, Oklahoma, to Sunray Oil's Wynnewood control station, 25 miles away. These radio-controlled booster stations, the first of their kind, increased Sunray Oil's products pipe line capacity by 25 per cent.



EASY-TO-READ, accurate Bristol Metameter Telemeter receivers at the Wynnewood control station provide a continuous record of performance at booster stations 24 hours a day.

Find out how Bristol Metameter Telemeters can help *you* — write for free 40-page booklet M1710. The Bristol Company, 114 Bristol Road, Waterbury 20, Conn.

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AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

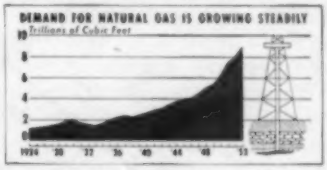
Harnessing the horsepower of the ages...

Nature made it millions of years ago. America uses it today. Natural gas! Hotter, cleaner, more efficient . . . the world's finest fuel for homes and industry.

The use of natural gas has doubled in ten years. Tennessee Gas, America's longest pipeline, plays a major part in meeting the rapidly increasing demand. Free from storms and traffic delays, this 2200-mile underground steel highway transports a billion and a half cubic feet of gas a day!

Brings a whole new world of heat, energy and power to people and industries that never knew it before.

Plentiful, low cost, easily controlled, natural gas today plays a larger role in more and more industries. Pictured above—its use in processing jet engine parts.



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TRANSMISSION COMPANY
HOUSTON, TEXAS
AMERICA'S LEADING TRANSPORTER OF NATURAL GAS

One of a series of advertisements appearing in full color in national publications.

More Horsepower... for Tomorrow!

Here's another message which tells America that every year there's *more* natural gas . . . to serve the nation in peace and war . . . to serve the public industrially and domestically. TENNESSEE GAS Transmission Company is convinced that understanding of the fast-growing natural gas industry is important to us all.

TENNESSEE GAS TRANSMISSION COMPANY
HOUSTON, TEXAS

TRANSCO LAYS FIRST CROSS-COUNTRY 36-INCH PIPE LINE

J. O. "Red" WILLETT *handles the big pipe with* A LORAIN MOTO-CRANE®

Transcontinental Gas Pipe Line Corporation has pioneered in a new field of pipe line construction. The first major installation of a 36-inch pipe line has been completed, covering 48 miles in Mississippi and Alabama. This $6.5 million expansion project has made pipe line news and may be the forerunner of bigger lines to come. Contractor for this new transmission line was Associated Pipe Line Contractors, Inc. of Houston, who have purchased five Lorains to date.

J. O. "Red" Willett Co., 4-time Lorain owner of Monroe, Louisiana, was the stringing and hauling subcontractor on this history-making project. One of their Lorains, a model MC-414 Moto-Crane, played an important role in loading and unloading the big 36-inch pipe sections at the coating yard. Mobility and lifting capacity of the Moto-Crane made it easy for Willett to handle the 40-ft. sections which run 155 lbs. per foot.

This is another example of Lorain Moto-Cranes serving pipe line construction. These 2-engine machines are designed to roll on rubber over surfaced roads at speeds up to 45 m.p.h. . . . or they can travel a rough right-of-way because of the tractive effort of their low-speed range, plus the soft-ground flotation of their big, multiple rubber tires. Along the right-of-way, uses are unlimited—stringing pipe, setting gate valves, digging ditches, backfilling, unloading machinery—a few of the many cost-cutting jobs for a Moto-Crane.

If your spread is not already equipped with versatile, mobile Moto-Cranes, contact your Thew-Lorain Distributor for complete facts.

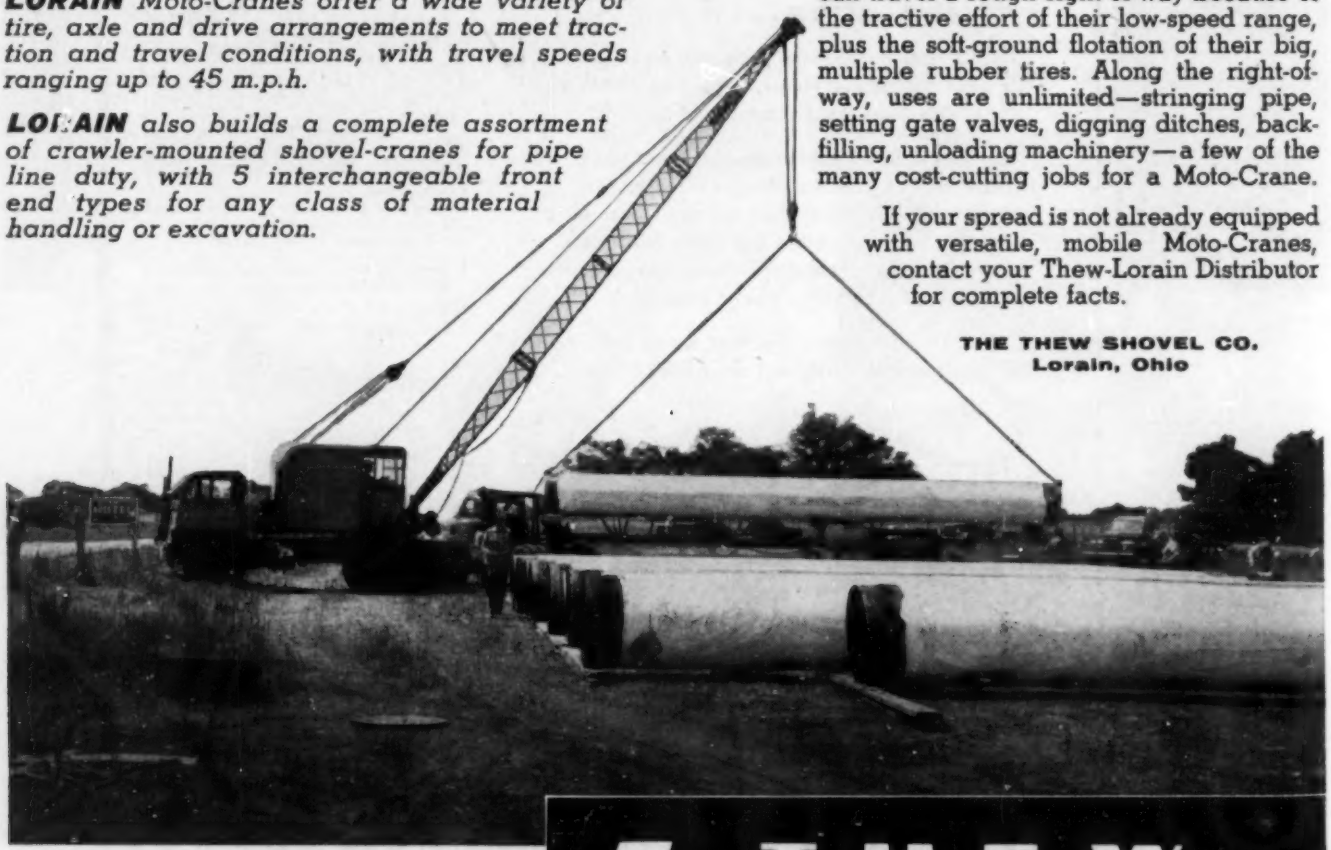
THE THEW SHOVEL CO.
Lorain, Ohio

LORAIN *Moto-Cranes range from 6-ton to 45-ton lifting capacity—the most complete selection of rubber-tire cranes on the market.*

LORAIN *Moto-Crane carriers are specifically designed throughout for shovel-crane loads and service . . . designed and built by the originator of the truck-crane idea.*

LORAIN *Moto-Cranes offer a wide variety of tire, axle and drive arrangements to meet traction and travel conditions, with travel speeds ranging up to 45 m.p.h.*

LORAIN *also builds a complete assortment of crawler-mounted shovel-cranes for pipe line duty, with 5 interchangeable front end types for any class of material handling or excavation.*



OFFERING MORE THAN 136 SHOVEL-CRANE COMBINATIONS ON CRAWLERS OR RUBBER TIRES . . . TO BEST FIT YOUR JOB FOR PROFIT!

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PIPE LINE INDUSTRY

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PIPE LINE INDUSTRY for the oil and gas pipe line industry.

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PETROLEUM REFINER and **THE REFINERY CATALOG** for the refining-natural gasoline-petrochemical industry.

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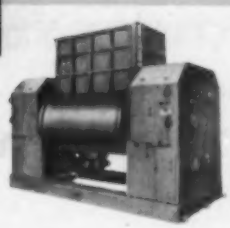


This 20-inch diameter Armco Welded Steel Pipe is being installed as line pipe for gas transmission by the El Paso Natural Gas Company, San Juan Basin, Farmington, New Mexico.

Armco Pipe Eliminates 26 Joints Every Mile

Armco Welded Steel Pipe is supplied in 50-foot lengths instead of the usual 40-foot lengths. It takes 106 joints per mile with Armco Pipe; 132 joints with 40-foot pipe. Thus, Armco Pipe eliminates 26 joints per mile. This means you have fewer pipe sections to handle; labor costs are held down, and installation goes faster.

Because Armco Welded Pipe is supplied in *exact* lengths rather than the usual double-random lengths, you are able to compute in advance exactly how many lengths and joints will be required for any installation.

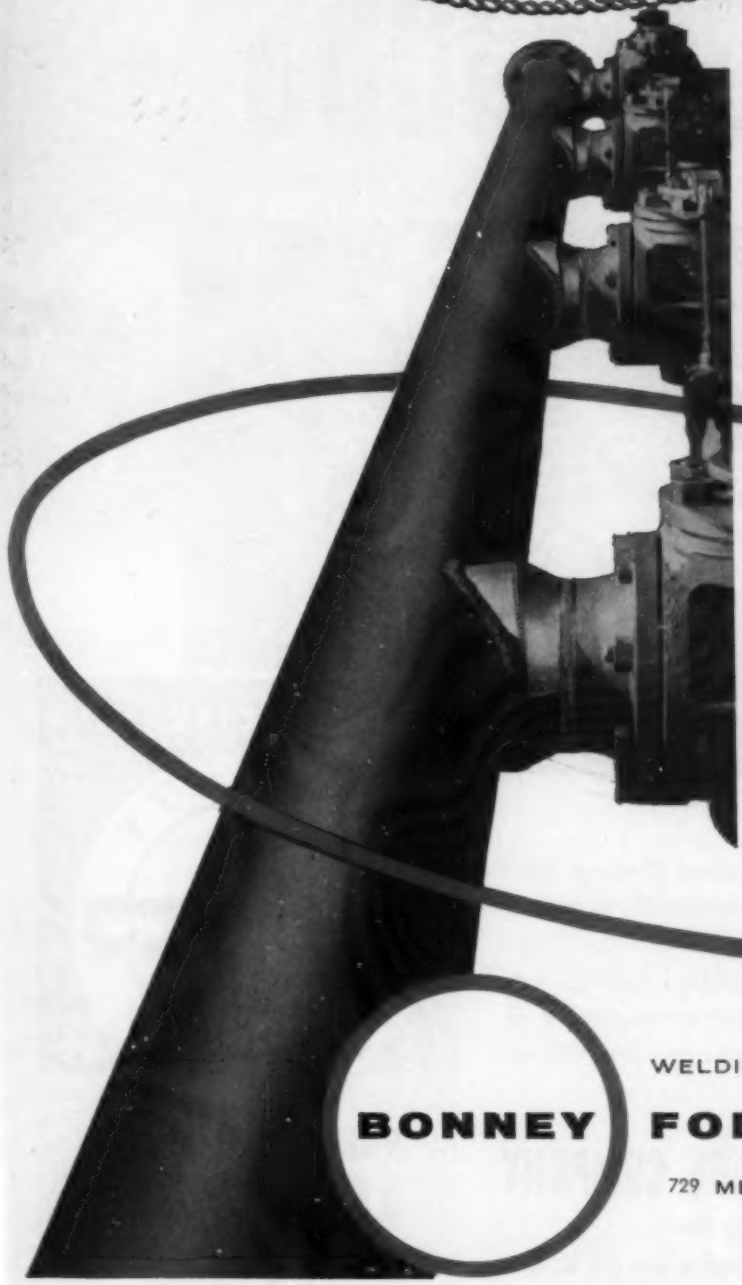
And with the 20 diameters available with Armco Welded Pipe—6 to 36 inches—it's easy to select the right diameter for your needs. You won't have to buy more capacity than the installation warrants.

Then, too, with 10 wall thicknesses—from $\frac{9}{64}$- to $\frac{1}{2}$-inch—you can select exactly what you need and avoid buying extra costly metal.

Use Armco Welded Steel Pipe for requirements in the Natural Gasoline and Natural Gas Divisions and wherever else you need dependable line pipe. Write for data. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 3855 Curtis St., Middletown, Ohio. 201 KOME Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO WELDED STEEL PIPE

ARMCO®



customer reduces estimate of job cost $24,000 by switch to WELDOLETS

An oil piping contract recently was reduced by $24,000 by changing specifications to WELDOLET welding fittings.

Comparable savings are possible on almost every piping contract. It will pay you to examine this positive means of reducing your piping costs. Write us for details.

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Manufacturers of Carbon, Alloy and Yoloy Steel

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HUDSON Solo-aire and Combin-aire COOLING UNITS

minimize water consumption in the Pegasus Plant of Magnolia Petroleum Company, Midland County, West Texas

Pictured in the foreground is the HUDSON Combin-aire unit, with Solo-aire units in the background. Air is used directly for cooling in the Solo-aires where low temperatures are not required. The Combin-aire uses a small quantity of water to precool the air so that entering hot fluids may be cooled to effluent temperatures lower than those obtainable by direct use of air.

If the total heat load of this plant had been dissipated thru a conventional cooling tower, 158 million gallons of water per year would have been required for makeup. The actual annual water makeup for the plant is only 17 million gallons per year. In this plant the use of the Solo-aire and Combin-aire have proven advantageous, resulting in savings in first cost, in operating costs for horsepower, water treating, and maintenance, and in obviating necessity for drilling of several water wells. Savings in cost of piping result thru installing the Combin-aire in close proximity to process equipment, made possible because the effluent high temperature air is always under-saturated with water vapor and nuisance and high maintenance cost due to water carryover or condensation are eliminated.

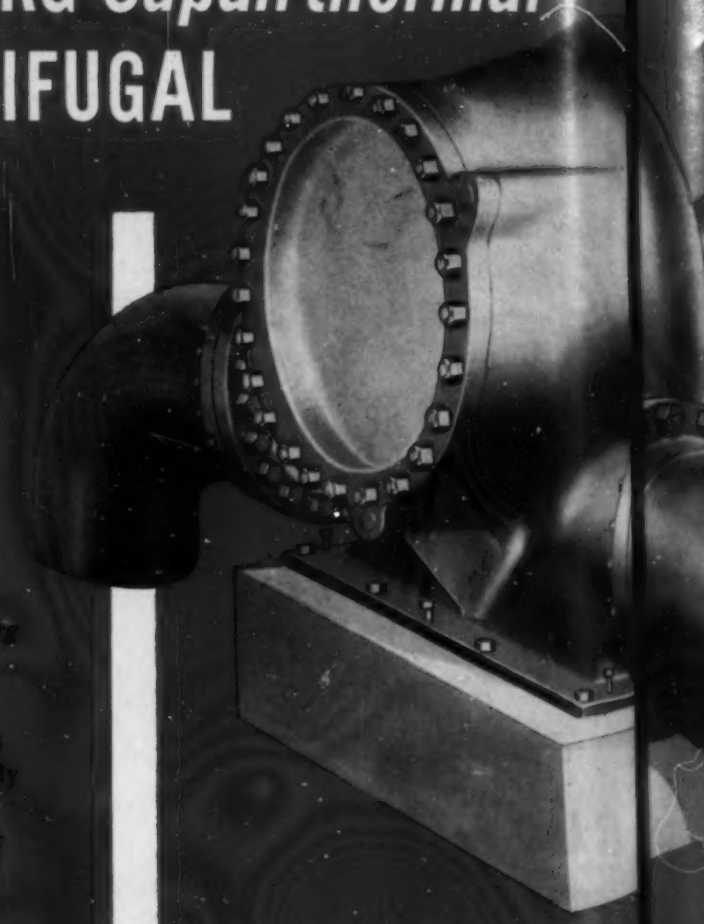
New bulletin
"Cooling with Air"
mailed upon request

HUDSON
ENGINEERING CORPORATION

FAIRVIEW STATION • HOUSTON, TEXAS

Presenting the NORDBERG *Supairthermal* ENGINE-DRIVEN CENTRIFUGAL COMPRESSOR UNIT

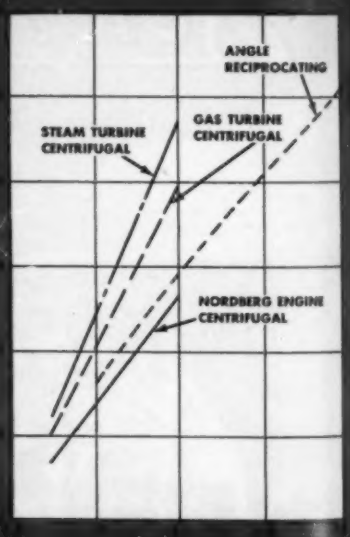
for Maximum Economy in GAS PIPE LINE SERVICE



Nordberg Mfg. Co., pioneer builder of internal combustion engines, presents the latest development in compact, dependable power for maximum efficiency and economy in gas pipe line transmission service . . . *The Nordberg Supairthermal Engine-Driven Centrifugal Compressor Unit.*

Through use of exclusive design principles, the Nordberg *Supairthermal* spark-ignition gas engine operates at better than 40% thermal efficiency—with correspondingly lower fuel cost, increased horsepower, lower lube oil consumption, and lower maintenance costs per horsepower hour. The *Supairthermal* engine drives the compressor through a close-coupled speed increasing gear mounted on the bedplate extension of the engine. *Here, then, is an extremely compact, efficient engine-driven compressor unit which can be installed at low capital investment and operated at lower cost per horsepower than any other type of gas pipe line prime mover.*

With a complete range of engine types and sizes to choose from, backed by engineering experience second to none, it will pay you to consult Nordberg on specific power problems. *Call or write for full details, outlining your requirements.*



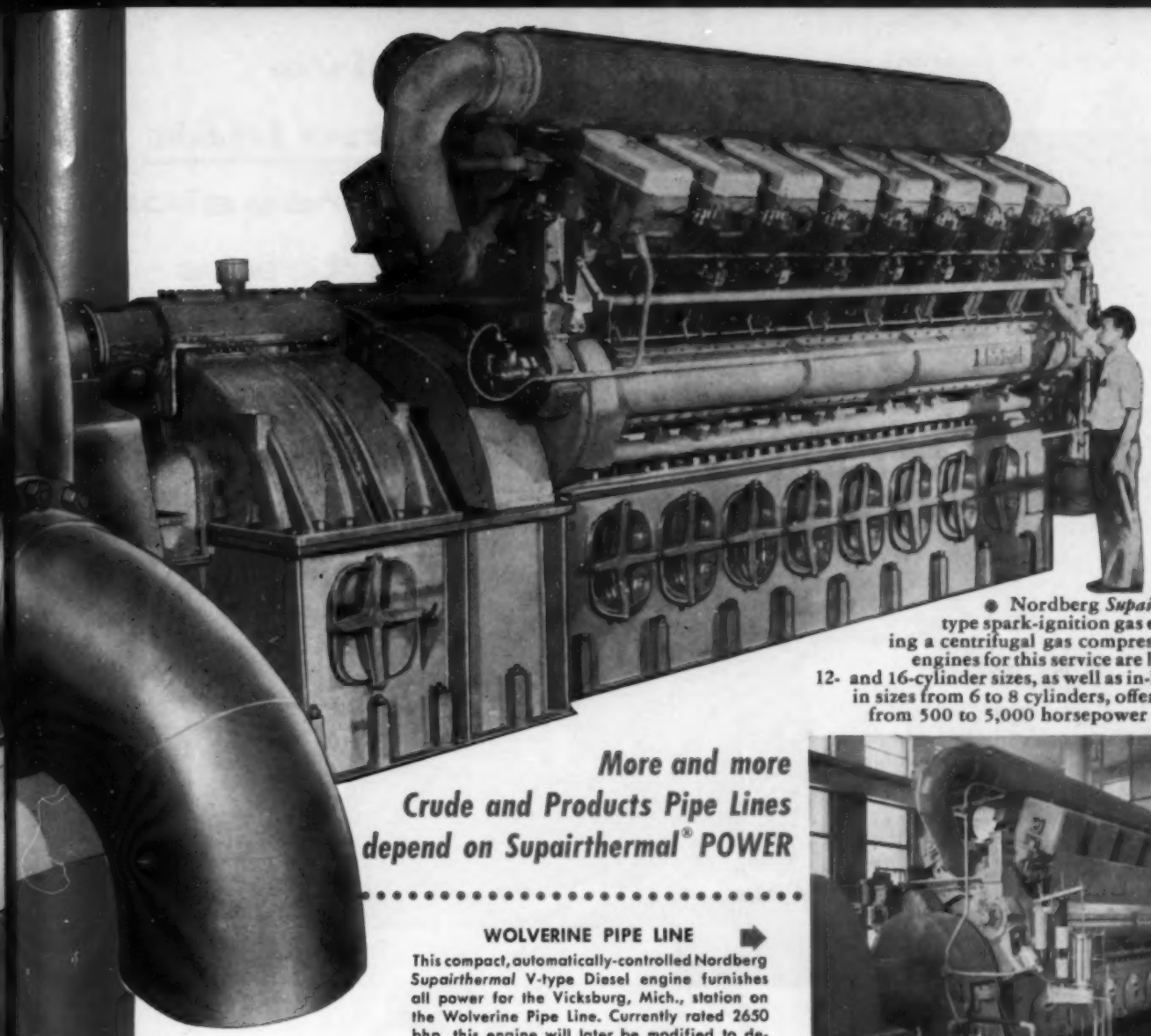
Savings of thousands of dollars per day in fuel costs on large gas pipe lines can be realized with the Nordberg engine-driven centrifugal gas compressor unit because, as the graph at the right shows, the Nordberg unit requires less fuel to compress gas than any other modern type of equipment of comparable capacity.

NORDBERG POWER CHIEF GAS ENGINES

● NORDBERG *POWER CHIEF* Gas Engines are low cost, medium speed units, built for rugged oil field service. In jobs like production pumping and rig lighting, where 'round-the-clock performance is a must, you'll find these sturdy *POWER CHIEF* units capable of delivering maximum power at minimum operating and maintenance cost.

Sold as power units, delivering 15 hp max., with clutch power take-off, and as "packaged" generator sets producing up to 10 kw.

POWER CHIEF units are also available for Diesel service in 1, 2 and 3 cylinder units, from 10 to 45 hp.

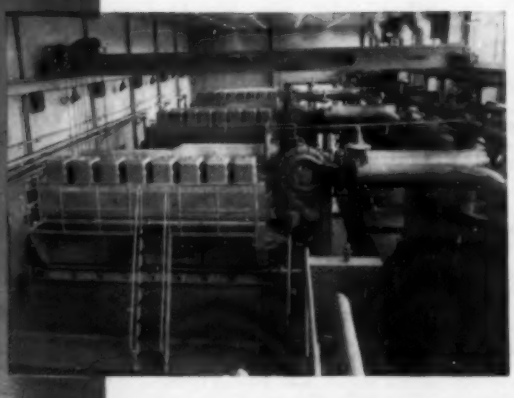


● Nordberg *Supairthermal* V-type spark-ignition gas engine driving a centrifugal gas compressor. V-type engines for this service are built in both 12- and 16-cylinder sizes, as well as in-line engines in sizes from 6 to 8 cylinders, offering a range from 500 to 5,000 horsepower per engine.

More and more Crude and Products Pipe Lines depend on Supairthermal® POWER

WOLVERINE PIPE LINE

This compact, automatically-controlled Nordberg *Supairthermal* V-type Diesel engine furnishes all power for the Vicksburg, Mich., station on the Wolverine Pipe Line. Currently rated 2650 bhp, this engine will later be modified to develop 3200 bhp when additional line capacity is desired.

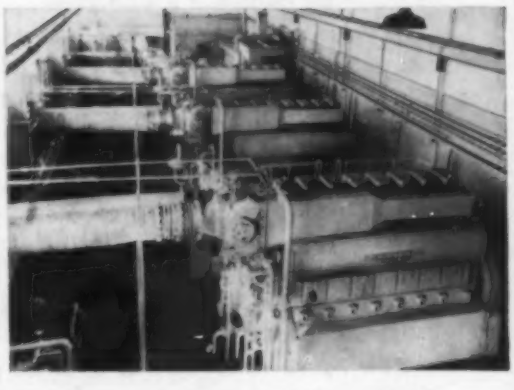


LAKEHEAD PIPE LINE

Twelve power-packed Nordberg *Supairthermal* engines will provide a total of 22,680 bhp for pumping stations along the Lakehead Pipe Line from the Canadian border to Superior, Wis., and from there to Sarnia, Ont.

TRANS MOUNTAIN PIPE LINE

Twelve powerful, compact Nordberg *Supairthermal* engines totaling over 20,000 horsepower have been given the tough power assignment of supplying the "big push" over the Canadian Rockies of crude oil from Edmonton, Alta., to Vancouver, B.C., for the Trans Mountain Pipe Line Co., Ltd.



NORDBERG MFG. CO., Milwaukee, Wisconsin

Builders of America's Largest Line of Heavy Duty Engines—10 to over 10,000 Horsepower

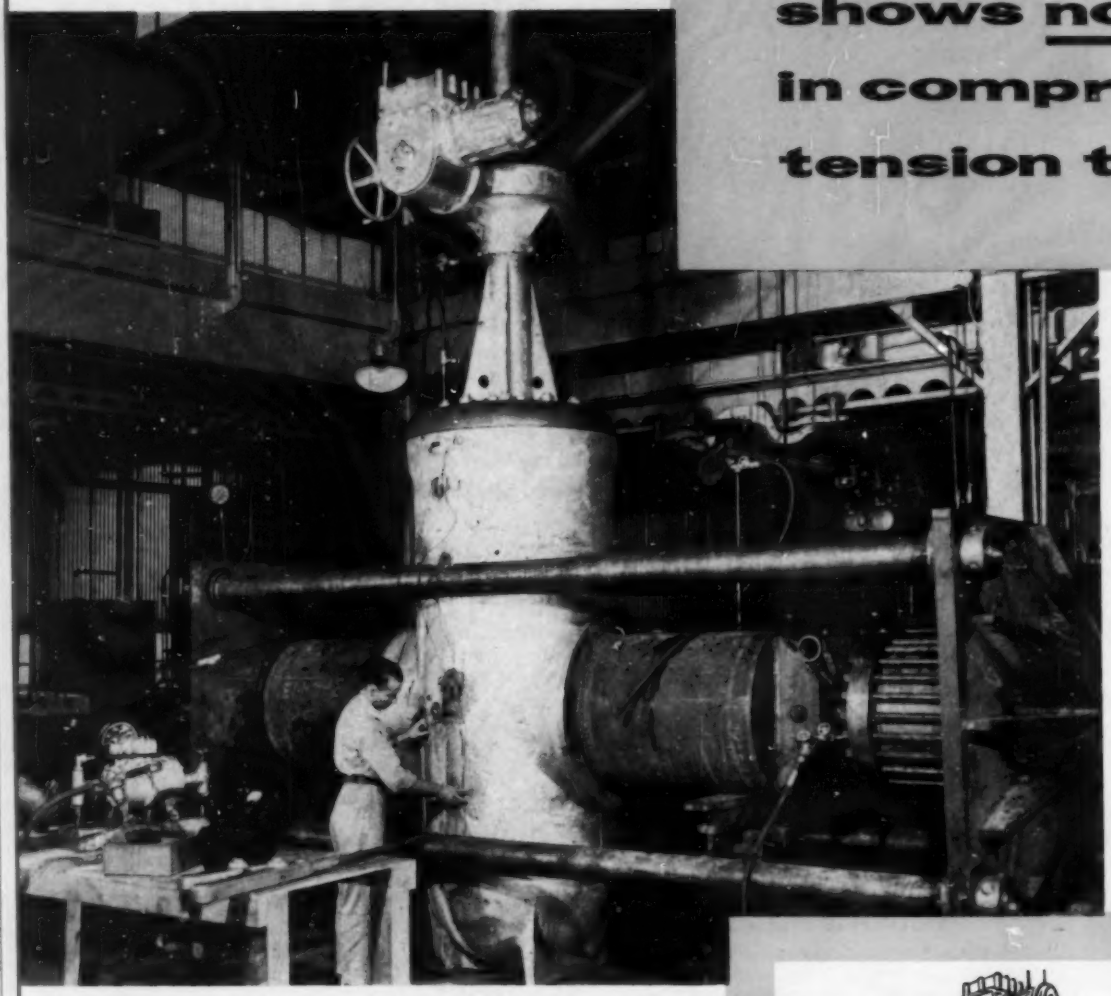
NORDBERG

DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

0454

Copyright 1954, Nordberg Mfg. Co.

W-K-M Valve shows no leak in compression-tension tests



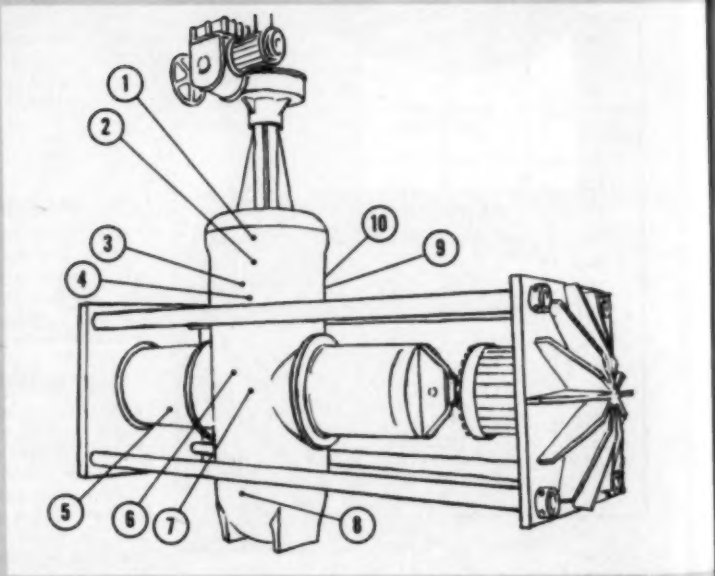
A special test was made in the W-K-M plant to determine what effect external compression and tension loads would have on seal-off and operation of a W-K-M Valve.

This test was conducted using a 30" ASA 400 p.s.i. weld-end gate valve operated by an electric motor. Ten strain gages were placed in the valve at locations shown on the diagram at right.

Using a hydraulic cylinder, an external differential tension load of 675 tons was applied to the valve while maintaining maximum working pressure against the gate.

During the tests the recorded strain-gage readings indicated no fibre stresses in excess of code allowables, indicating no appreciable body distortion. The valve did not leak and operated freely under all conditions.

W-K-M Pipeline Valves have been tested and proved in the laboratory and out on the line for more than thirty years. They offer the world's finest valve performance. Ask a W-K-M sales engineer to demonstrate a scale model valve.

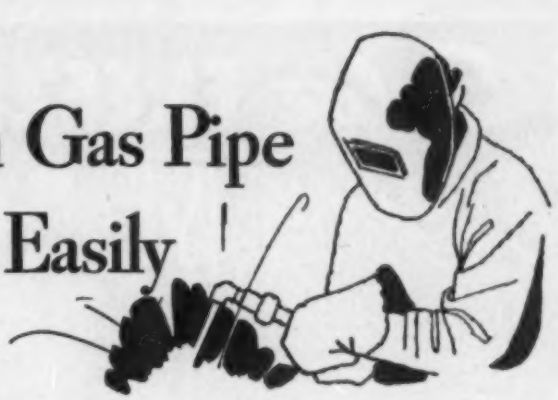


The above sketch shows the placement of the strain gages used in the test.

W-K-M Valves

W-K-M Manufacturing Company, Inc.
A subsidiary of A.C.F. Industries Incorporated
P. O. Box 2117, Houston 1, Texas
Los Angeles, California
Export Office: 45 Rockefeller Plaza, New York, N. Y.

Bethlehem High-Strength Gas Pipe Resists Fatigue—Welds Easily



Bethlehem High-Strength Gas Pipe is recommended for pipe-line compressor stations and other locations where severe vibrations or extremely high pressures are encountered.

This pipe is fabricated from as-rolled plates of Mayari R, Bethlehem's high-strength low-alloy steel. Mayari R has a yield point of 50,000 psi min, an endurance limit of approximately 50,000 psi, high corrosion resistance and excellent workability and weldability.

RESISTANCE TO FATIGUE—Mayari R steel's endurance limit is unusually high—about 50,000 psi (60 to 75 pct of its tensile strength of 70,000 psi minimum). In addition, Mayari R steel is extremely ductile, with 22 pct minimum elongation in 2 in. Pipe fabricated from Mayari R plate has the exceptional endurance strength, extreme ductility and high impact qualities needed for handling vibration, pulsation and variable shock-loadings.

LIGHTER WALLS—When you use Bethlehem High-Strength Gas Pipe you can specify much lighter walls than with ordinary carbon-steel pipe. This results in savings in material, as well as in the cost of transportation, handling and field welding.

WELDS READILY—Bethlehem High-Strength Gas Pipe is readily welded by following normal field-welding procedures, using mild steel electrodes.

FOR NORMAL PIPELINE SERVICE we recommend Bethlehem Gas Pipe fabricated from carbon steel, meeting specifications ASTM A134 or API 5LX42. Comparative weights and test pressures for these grades of pipe, as well as for pipe made from Mayari R, are shown in the table below.

All grades of Bethlehem Gas Pipe are made in 40-ft lengths, with beveled or square ends, and in all diameters from 18 in. OD. We can grit-blast, prime, coal-tar enamel and wrap the pipe to your specifications.

A phone call or letter to the nearest Bethlehem sales office will bring you full information about Bethlehem Gas Pipe, in Mayari R or carbon-steel grades.

Comparative Maximum Test Pressure: MAYARI R, API 5LX42 and ASTM A134 Steel Pipe

Pipe OD In.	¼ IN. THICK				⅜ IN. THICK				½ IN. THICK				¾ IN. THICK				1 IN. THICK			
	Wt lb per ft	Test Pressure psi Mayari R	API 5Lx42	ASTM A134*	Wt lb per ft	Test Pressure psi Mayari R	API 5Lx42	ASTM A134*	Wt lb per ft	Test Pressure psi Mayari R	API 5Lx42	ASTM A134*	Wt lb per ft	Test Pressure psi Mayari R	API 5Lx42	ASTM A134*	Wt lb per ft	Test Pressure psi Mayari R	API 5Lx42	ASTM A134*
18	49	1180	990	665	73	1770	1490	960	96	2360	1985	1275								
20	54	1120	920	575	81	1590	1340	860	107	2130	1785	1150								
22	63	965	820	520	93	1450	1220	815	118	1935	1630	1040								
24	67	885	750	475	99	1330	1120	745	130	1770	1490	955								
26	73	820	690	440	107	1225	1030	690	141	1635	1380	880	202	2450	2050	1325				
28	79	760	640	405	117	1140	955	640	153	1515	1275	820	219	2270	1910	1225				
30	85	710	595	380	125	1060	895	600	164	1415	1190	765	235	2130	1785	1145				
32	92	665	560	355	134	1000	835	560	176	1325	1115	715	252	1990	1675	1075	330	2650	2230	1430
34	97	625	525	335	143	940	785	505	187	1250	1050	675	268	1875	1575	1010	352	2500	2100	1350
36	105	590	495	315	152	885	750	480	200	1180	980	635	285	1770	1490	950	374	2360	1980	1275
42	118	505	425	270	173	760	640	410	228	1010	850	545	334	1525	1275	815	440	2020	1700	1090
48	135	440	375	235	199	665	560	360	263	885	745	475	384	1325	1115	715	506	1770	1485	955
60	170	355	300	190	252	530	450	285	331	710	595	380	483	1060	890	570	638	1415	1190	765
72	210	295	250	160	306	440	375	240	403	590	497	320	582	885	740	475	770	1180	990	635
84	238	250	215	135	353	380	320	205	464	505	425	270	672	755	635	410	902	1010	850	545

*ASTM A283 Grade B, to be used when ordering to ASTM A134 Specification. If ASTM A283 Grade C is used instead, the test pressures may be increased by 11 pct. Pipe can be furnished in diameters intermediate to those shown above.

Test pressures above are based on stressing steel to 85 pct of minimum yield point:
Mayari R—85 pct of yield point = 42500 psi
API 5LX42—85 pct of yield point = 35700 psi
ASTM A134—85 pct of yield point = 22950 psi
Formula used: $P = \frac{2ts}{D}$

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

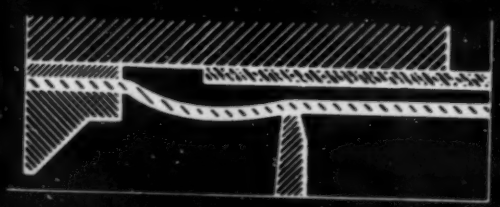
For more data on advertised products, use Readers' Service Cards, last page.

Solve FREEZING *Problems with* S&J "TITE-SEAL"

The Shand & Jurs "Tite-Seal" Breather Valve, illustrated here, is the practical answer to breather valve freezing problems. It incorporates a unique pallet design for both pressure and vacuum relief valves. The design utilizes a pliable diaphragm which provides the tightest possible seal through a novel balancing action. When venting, this diaphragm design provides a peeling action between the pallet and the seat, that overcomes sticking or freezing to a very marked degree.

The "Tite-Seal," Fig. ST-7575, is supplied with pliable, reinforced, synthetic rubber coated diaphragms for moderate climatic conditions, and with special diaphragms of Teflon coated fiberglass for extreme freezing hazards. The latter has been tested by impartial laboratories, government agencies, and by independent research organizations, and has been found to require only ¼" of water beyond normal setting to break ice. Yes, S&J "Tite-Seal" is the answer to your breather valve freezing problems.

S&J "Tite-Seal" in action. Typical pallet shown at the right. In operation, tank pressure is directed through a port to a chamber outside the periphery of the seat but inside the periphery of the pallet. This produces a slight ballooning which effects a perfectly tite-seal at all pressures below that for which the pressure pallet of the breather valve is set to open.



Shand and Jurs Co.

BERKELEY 10, CALIFORNIA

NEW YORK
342 Madison Ave.

HOUSTON
M & M Bldg.

TULSA
Thompson Bldg.

CHICAGO
10409 S. Western Ave.

LOS ANGELES
714 W. Olympic Blvd.

REPRESENTATIVES:
SEATTLE: Nebar Supply Company, 3000 Western Avenue
MONTREAL: Lytle Engineering Specialties, Ltd., 360 Notre Dame St., W.
TORONTO: Lytle Engineering Specialties, Ltd., 85 Richmond St., W.
VANCOUVER: P. D. McLaren & Son, Ltd., 3277 Main Street
CARACAS: Sinclair Spence, C.A., Edificio Galipan
ENGLAND: Whessoe, Ltd., Sales: 25 Victoria St., London, S.W. 1
Whessoe, Ltd., Works: Darlington, County Durham

Push-button Pipelines

Engineered and built by Gulf Interstate Engineering Company

You can now get a pipeline system designed to cut operating costs to a minimum. Gulf Interstate's new techniques and advanced designs actually reduce many operations to a matter of pushing buttons.

Gulf Interstate Engineering will contract to engineer, design or build these pipelines, compressor stations or allied facilities any place . . . any time.

Your inquiries are invited.

Gulf Interstate Engineering Company

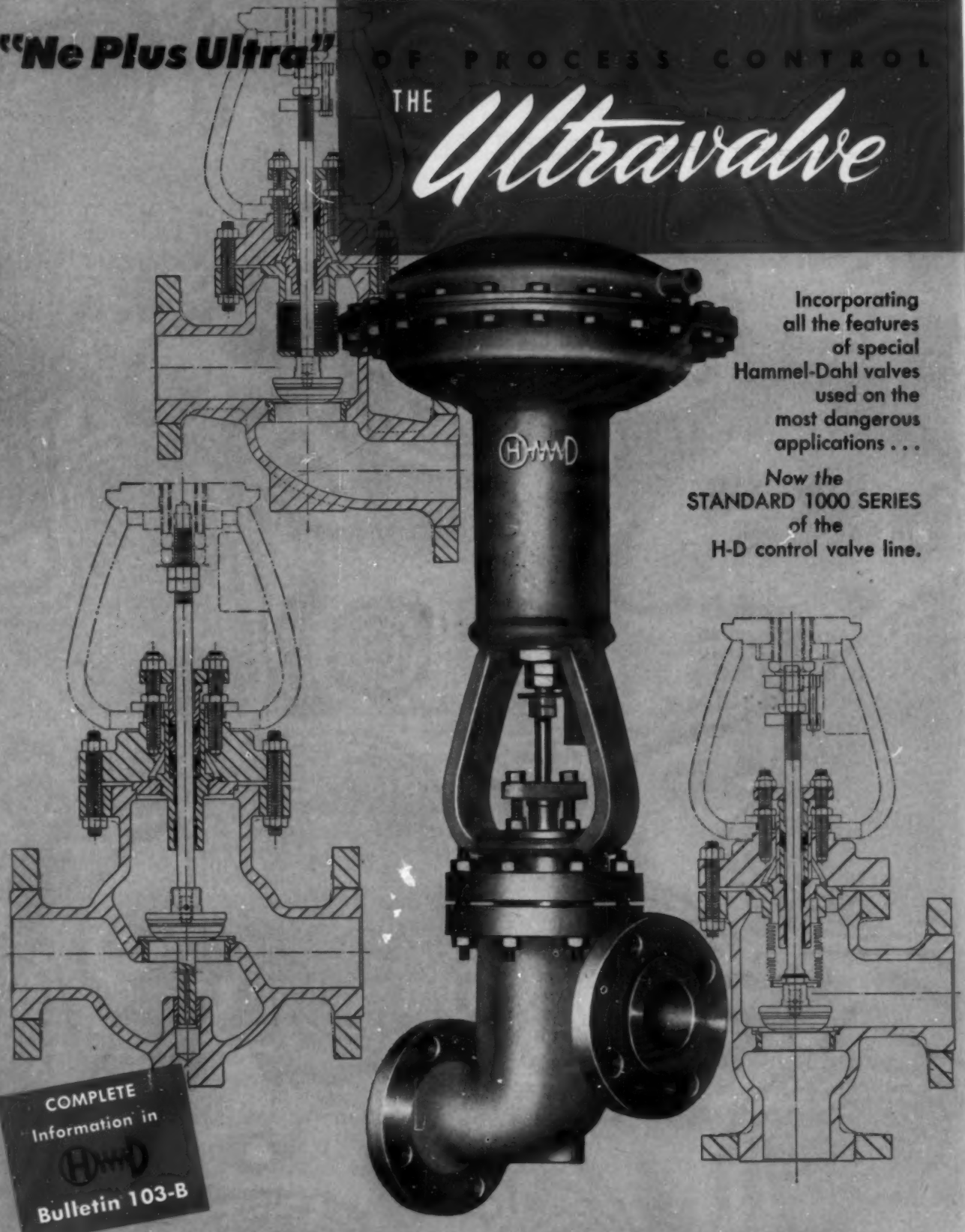
GULF INTERSTATE BUILDING • HOUSTON, TEXAS

For more data on advertised products, use Readers' Service Cards, last page.

"Ne Plus Ultra"

OF PROCESS CONTROL

THE *Ultravalve*



Incorporating all the features of special Hammel-Dahl valves used on the most dangerous applications . . .

Now the STANDARD 1000 SERIES of the H-D control valve line.

COMPLETE Information in Bulletin 103-B

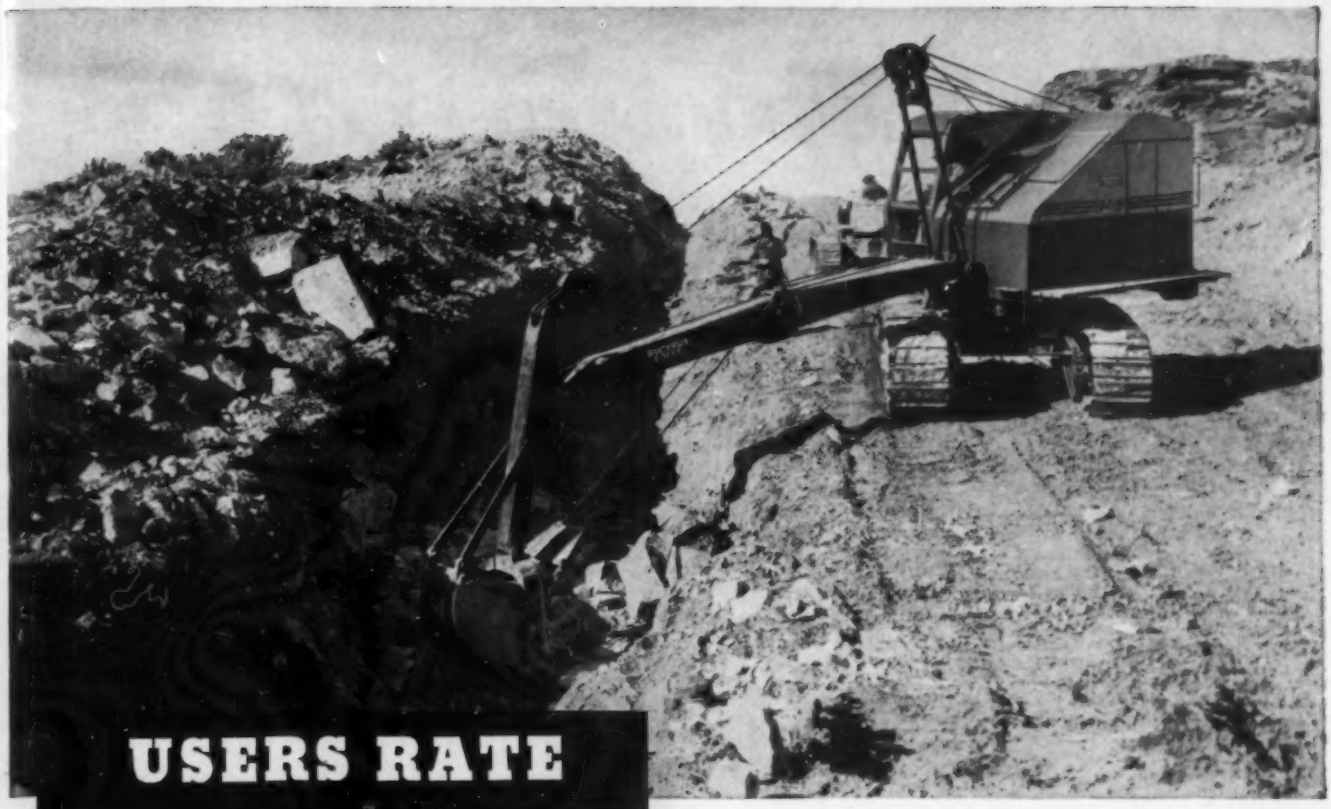
HAMMEL-DAHL COMPANY

175 POST ROAD, (WARWICK) PROVIDENCE 5, R. I., U. S. A.

SALES OFFICES IN ALL PRINCIPAL CITIES

MANUFACTURING PLANTS IN WARWICK, R. I., U. S. A., CANADA, ENGLAND, FRANCE AND HOLLAND

CANADIAN MANUFACTURING AFFILIATE—GUELPH ENGINEERING CO., GUELPH, ONT.



USERS RATE BUCYRUS-ERIE 22-B's . . . TOPS For Pipeline Service

GENERAL SUPERINTENDENT: "I think Bucyrus-Erie machines are the best we can find for our pipe-lining purposes."

SPREAD SUPERINTENDENT: "I like everything about Bucyrus-Eries. These machines are more economical to operate on our pipeline work. They are faster in operation, and the high road gear is good on road travel. We always get good service on the few parts we need."

HOE FOREMAN: "You can't beat a Bucyrus-Erie. The 22-B is fast, smooth and easy to handle. It has good brakes for hill work and the digging locks are especially good on rough ground . . . handles better than similar machines."

OPERATOR: " . . . fine for steering, has a good grip and plenty of clearance."

MECHANIC: "Bucyrus-Erie track-type treads will out-wear four sets of conventional treads. The cleats hold well on hills and snow." 44E54

The above are actual quotes from men on two spreads in the Southwest. Out along the pipeline nothing counts but good, solid performance and it is here that the Bucyrus-Erie 22-B dragshovel is winning the highest praise for trenching and backfilling work.*

The complete story on the 22-B will convince you that it's your best bet on any pipeline job . . . see your Bucyrus-Erie distributor for details, or write us.

* Names will be supplied on request.

BUCYRUS ERIE

South Milwaukee, Wisconsin

For DEPENDABLE

Look to

J&L STEEL

Location and up-to-date shipping installations are the big reasons line pipe users can depend on J&L for efficient delivery of a quality product.

In addition to nationwide rail service out of Pittsburgh, J&L's modern pipe mills at Aliquippa, Pa., are ideally located to make use of the nation's vast network of inland waterways.

To cash in on its mill location . . . further assure prompt deliveries, J&L maintains large stocking facilities at Aliquippa and operates its own extensive loading installations for river barge docking and for rail shipments.

Take a look at the map. If you want prompt, efficient delivery of a quality line pipe, chances are you'll find J&L can serve you best.

Loading line pipe at J&L's Aliquippa, Pa., barge docks

J&L's stocking and rail loading facilities at Aliquippa, Pa.

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

J&L STEEL

Line Pipe Delivery

Principal Waterways of the United States
Reproduced by permission of Waterways

J&L PIPE

J&L STEEL

By Water

United States Railroads. Reproduced by permission of Simmons-Boardman Publishing Corporation

J&L PIPE

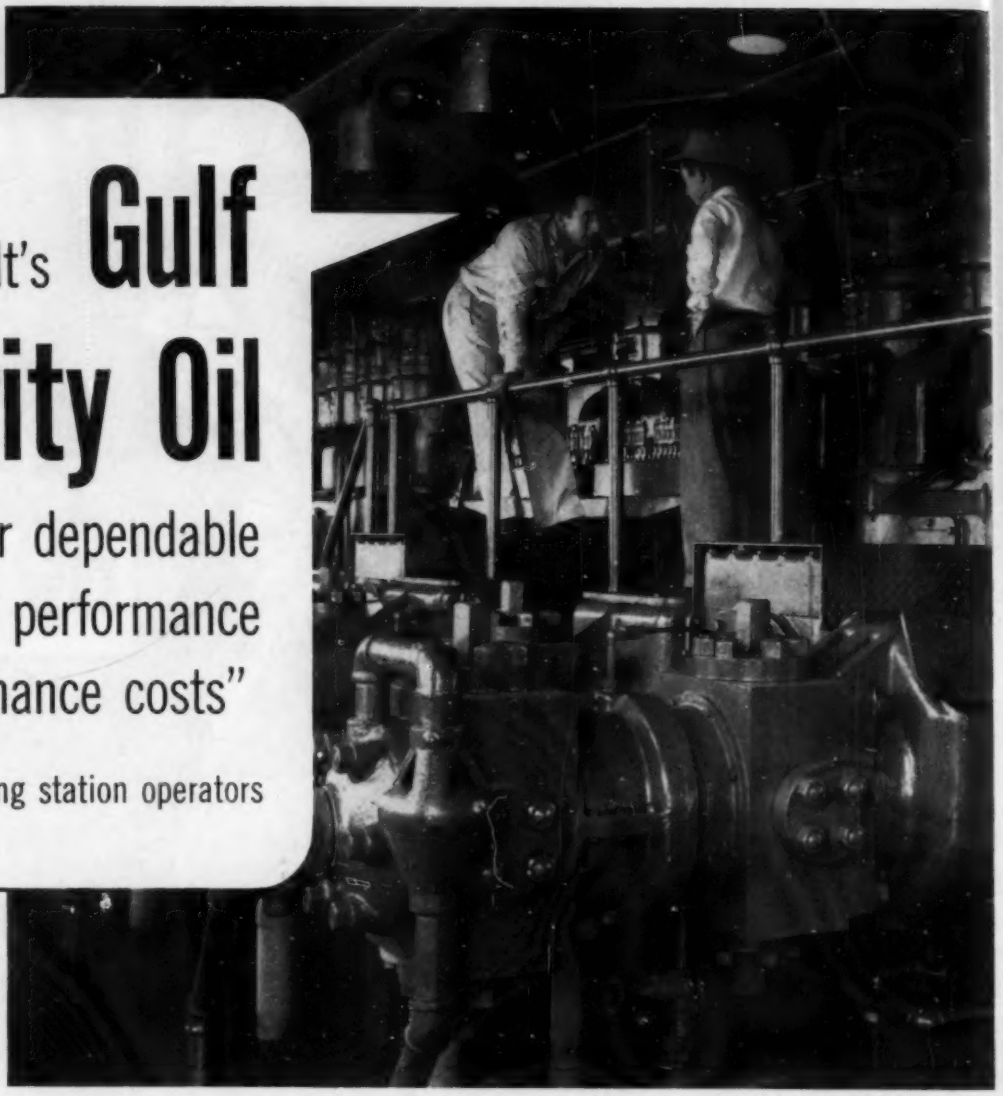
J&L STEEL

By Rail

"It's Gulf Security Oil

for dependable gas compressor performance and low maintenance costs"

say pumping station operators



Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

If you are installing new compressor units, or feel that you're not getting the most effective lubrication possible for your present units, it will certainly pay you to try Gulf Security Oil. Contact your nearest Gulf Office and have a Gulf Sales Engineer call.

Gulf Oil Corporation • Gulf Refining Company

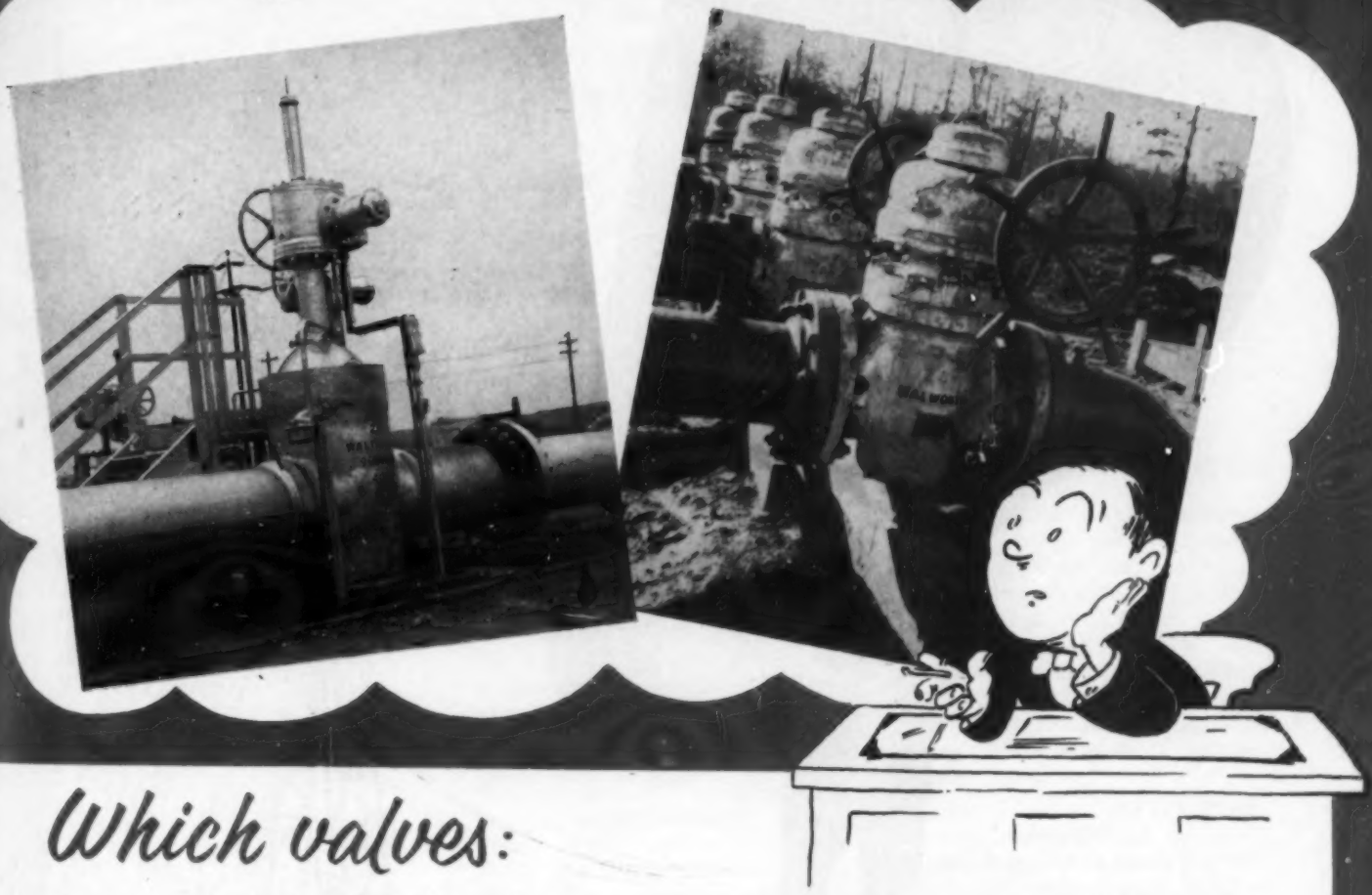
1822 GULF BUILDING, PITTSBURGH 30, PENNSYLVANIA

GULF

The finest petroleum products for your every need

2 Questions

WITH THE SAME ANSWER



Which valves:

Gates or Lubricated Plugs?

Walworth engineers work directly with pipeline engineers and operators—suggesting valves for all types of pipeline installations. They're quick to recognize a condition where a quick-opening lubricated plug valve is best employed—or, one where a gate valve will be better for a particular requirement. Whenever you are faced with the problem of selecting proper pipeline valves—call Walworth.

Where can I get them?

From Walworth—because Walworth makes *both* gate valves and lubricated plug valves. That's why Walworth's recommendations will be unbiased. And there is a Walworth representative or distributor near you. They are situated in principal centers throughout the world. Write, phone, or wire for further details.

WALWORTH

Manufacturers since 1842

valves • fittings • pipe wrenches

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Speeding more gas to the nation

To HELP MEET the nation's growing demand for natural gas, hundreds of new gathering lines are being installed to feed the huge transmission lines.

To help keep these construction jobs on schedule, purchasers of line pipe are relying more and more on the prompt delivery of Basalt-Kaiser line pipe.

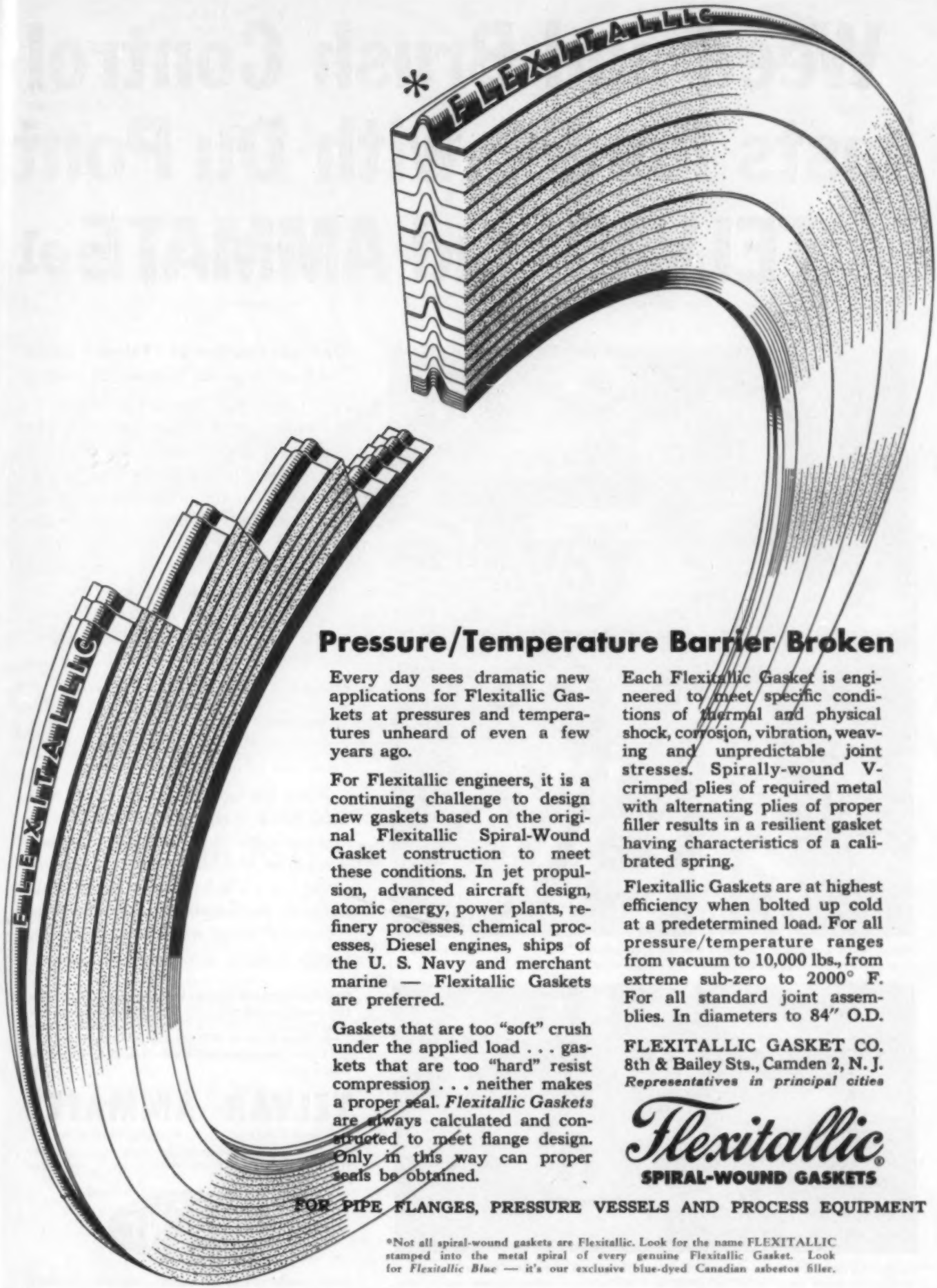
This dependable delivery—plus *uniform quality, wide range of sizes* and *experienced technical and metallurgical* service—is another reason why pipeline companies are careful to specify Kaiser Steel.

Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	14" to 18" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	20" to 30" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Denver, Tulsa, New York



Pressure/Temperature Barrier Broken

Every day sees dramatic new applications for Flexitallic Gaskets at pressures and temperatures unheard of even a few years ago.

For Flexitallic engineers, it is a continuing challenge to design new gaskets based on the original Flexitallic Spiral-Wound Gasket construction to meet these conditions. In jet propulsion, advanced aircraft design, atomic energy, power plants, refinery processes, chemical processes, Diesel engines, ships of the U. S. Navy and merchant marine — Flexitallic Gaskets are preferred.

Gaskets that are too "soft" crush under the applied load . . . gaskets that are too "hard" resist compression . . . neither makes a proper seal. *Flexitallic Gaskets* are always calculated and constructed to meet flange design. Only in this way can proper seals be obtained.

Each Flexitallic Gasket is engineered to meet specific conditions of thermal and physical shock, corrosion, vibration, weaving and unpredictable joint stresses. Spirally-wound V-crimped plies of required metal with alternating plies of proper filler results in a resilient gasket having characteristics of a calibrated spring.

Flexitallic Gaskets are at highest efficiency when bolted up cold at a predetermined load. For all pressure/temperature ranges from vacuum to 10,000 lbs., from extreme sub-zero to 2000° F. For all standard joint assemblies. In diameters to 84" O.D.

FLEXITALLIC GASKET CO.
8th & Bailey Sts., Camden 2, N. J.
Representatives in principal cities

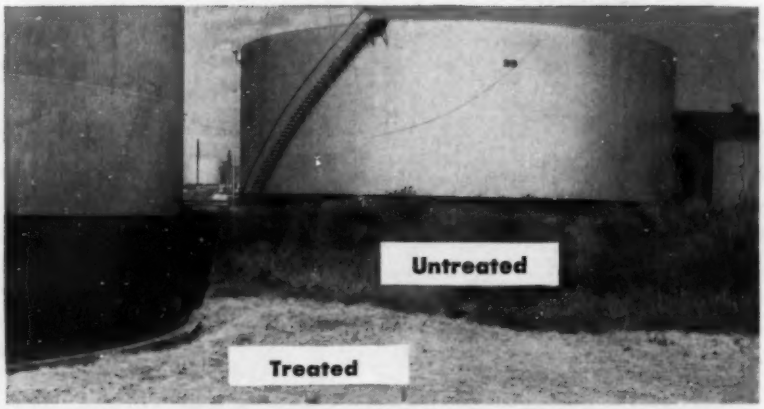
Flexitallic®
SPIRAL-WOUND GASKETS

FOR PIPE FLANGES, PRESSURE VESSELS AND PROCESS EQUIPMENT

*Not all spiral-wound gaskets are Flexitallic. Look for the name FLEXITALLIC stamped into the metal spiral of every genuine Flexitallic Gasket. Look for *Flexitallic Blue* — it's our exclusive blue-dyed Canadian asbestos filler.

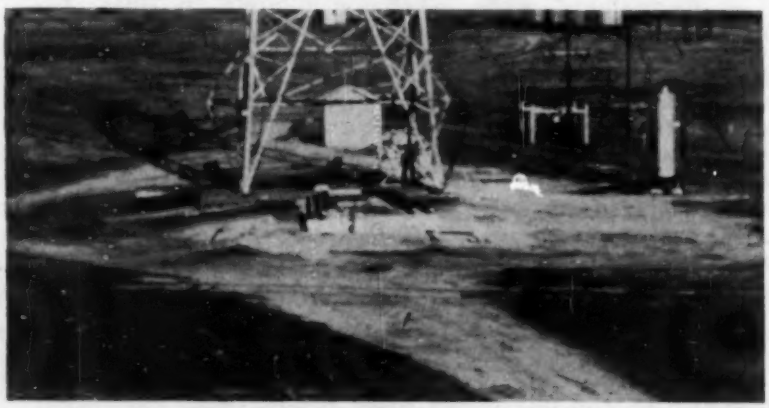
Weed and Brush Control lasts longer with Du Pont TELVAR® and AMMATE®

Weed Killers — *Weed and Brush Killer*



Fire hazards are reduced around oil storages from thorough, long-term weed control with Du Pont "Telvar." "Telvar" is non-corrosive, won't harm application equipment.

Heavy weed growth was controlled with one application of "Telvar." "Telvar" keeps pipelines and key areas accessible, efficient to work around.



"Telvar" is ideal for weed control around derricks, pumps, storages. "Telvar" is easy to apply; extremely low in toxicity to humans and animals; non-flammable; and non-volatile.

One application of "Telvar" solves weed problems for a season or longer!

"Telvar" kills through the roots . . . prevents regrowth. Low dosages (20 to 80 lbs. per acre) make it cost little for the results you obtain. Low rates also mean less handling, less storage facilities. If you're looking for a way to cut maintenance costs to new low levels, include "Telvar" in your weed-control program. Available in two formulations: "Telvar" W; and "Telvar" DW, which is especially suited for light, sandy soils and in areas where annual rainfall is higher than 20 inches.

"Ammate" kills more kinds of brush and keeps it down longer than most weed and brush killers!

When the original spray job is well done, brush is kept under control with nothing more than an occasional spot spray later. You can rely on "Ammate" to do the job safely, even where your rights-of-way adjoin crop land, because "Ammate" is not volatile. There are no vapors to drift onto sensitive crops.

FREE ILLUSTRATED BOOKLETS describe how to control weeds and brush with Du Pont chemicals. For your copies, write to Du Pont, Grasselli Chemicals Dept., Rm. D 4032, Wilmington, Del. In Canada—Du Pont Company of Canada Limited, Box 660, Montreal.

TELVAR® AMMATE®

Weed Killers — *Weed and Brush Killer*

On all chemicals always follow directions for application. Where warning or caution statements on use of product are given, read them carefully.

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

PIPE LINE PROGRESS

Northern Natural achieves billion cu. ft. daily line capacity... builds with A. O. SMITH LINE PIPE

Northern Natural Gas Company this year completes its expanded two-year construction program, with total daily pipe line capacity up to 1,100,000,000 cu. ft. 460 miles of new main line loops were laid in the two-year program, with twelve sections of loop line being laid each year. New line facilities bring natural gas to 71 additional communities in Iowa, Nebraska, Minnesota and South Dakota . . . so that the company now serves a total of 307 communities in the Northern Plains.

A. O. Smith's participation in the job consisted of 178 miles of 30-inch pipe and 60 miles of 20-inch pipe.

Highly regarded in the industry because A. O. Smith welded steel pipe is consistently accurate in size, roundness and end-to-end matchup. A. O. Smith has supplied all or a part of the line pipe for most major pipe lines in the country.

A. O. Smith Line Pipe is available in a complete range of sizes and wall thicknesses, from 8⅝-in. to 36-in. diameters.

The A.O.Smith Casing Mill is operating at capacity to supply vitally needed casing for the Oil and Gas Industry.

Through research ... a better way

A.O.Smith

CORPORATION

TUBULAR PRODUCTS DIVISION

Milwaukee 1, Wisconsin

Chicago 4 • Dallas 2 • Houston 2 • Los Angeles 22 • Midland 5, Texas • New Orleans 12 • New York 17 • Pittsburgh 19 San Francisco 4 • Seattle 1 • Tulsa 3 • Washington 6, D.C.

International Division: Milwaukee 1

For more data on advertised products, use Readers' Service Cards, last page.

Another submarine crossing for NATIONAL SEAMLESS...

Welded sections of National Seamless Pipe being ramped into the river from the lay barge. Barges at left assisted in laying-in operations. In the background is the huge 212-foot dredge used in the crossing.

This 18-inch diameter, 1⅛-inch wall National Seamless Steel Pipe weighed 208 pounds per foot. Due to its thickness, weights and special coatings were unnecessary.

The ramp of the lay barge. Welding of this heavy-wall pipe was slow—taking about four hours for two welders to complete one weld, using 3/16-inch rod.

National Seamless Pipe being welded into 80-foot sections on the river bank. The dredge is at work in the background. An estimated 3,000,000 cubic yards of earth had to be dredged to prepare a ditch for the pipe.

WALLS WITHOUT WELDS

TENNESSEE GAS TRANSMISSION COMPANY LAYS THREE 18-INCH LINES OF NATIONAL SEAMLESS PIPE ACROSS MISSISSIPPI RIVER

This new crossing of the Mississippi consists of three lines of National Seamless Pipe, laid parallel, 100-feet apart in a downstream loop in the bed of the river. On either side of the river, the three lines tie into the Tennessee Gas Transmission Company's new 576-mile 30" O.D. line, running from the Kinder, La., compressor station to Portland, Tenn. The Kinder-Portland line gives the company a direct connection for moving gas from south Louisiana and the Gulf of Mexico to eastern markets.

The preliminary preparations consisted of cleaning, priming, coating, and double-wrapping the 18-inch National Seamless Pipe. It was then welded into 80-foot sections on the river bank, and transferred to a barge. As the pipe was needed, it was transported to the laying barge in the river, where the 80-foot sections were welded together in a continuous line. A huge ramp on the laying barge was then used to ease the pipeline into the water.

Submarine crossings are among the most difficult and costly of pipeline installations. A suitable crossing spot has to be chosen very carefully. Dredging operations sometimes entail the moving of millions of cubic yards of earth. And once the pipe is laid, it has to be there permanently. It must withstand great pressures, absorb distorting and bending stresses. To do this, the pipe has to be strong, and extremely flexible. It has to be "trouble-free" for years and years to come. In short, it has to be USS National Seamless Steel Pipe.

NATIONAL TUBE DIVISION
UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

SEE THE UNITED STATES STEEL HOUR. **It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.**

NATIONAL SEAMLESS PIPE AND TUBES

IN RIVER CROSSINGS TOO — SEAMLESS DOES IT BETTER

USS

UNITED STATES STEEL

Only
4 pounds
of
SANTOLENE C
per
thousand
barrels

STOPS RUST in pipe lines!

CHECK LIST OF SANTOLENE C's EXTRA ADVANTAGES:

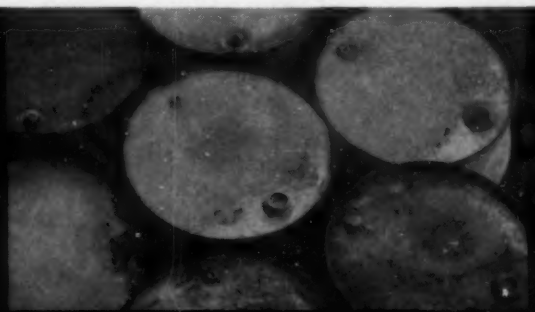
- ☐ Completely product-soluble
- ☐ A one-shot corrosion inhibitor
- ☐ Entirely organic . . . contains no electrolyte
- ☐ Waste-free and nontoxic
- ☐ Offers no waste disposal problem
- ☐ Controls corrosion under both static and dynamic conditions

Actual tests in field installations prove that only 0.0015% by weight of Santolene C in light petroleum product pipe lines will inhibit corrosion. Yet Santolene C has no significant effect on product quality because it burns completely with the fuel.

For full information on Santolene C, write Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Box 478-Y, St. Louis 1, Missouri.

MONSANTO
CHEMICALS – PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND



Santolene: Reg. U.S. Pat. Off.

Don't kick one leg out from under the stool!

FOR the consumer to be assured of ample natural gas far into the future—and for all phases of the gas industry to continue to prosper—there is one basic requirement—an increasing supply of natural gas at prices competitive with other fuels.

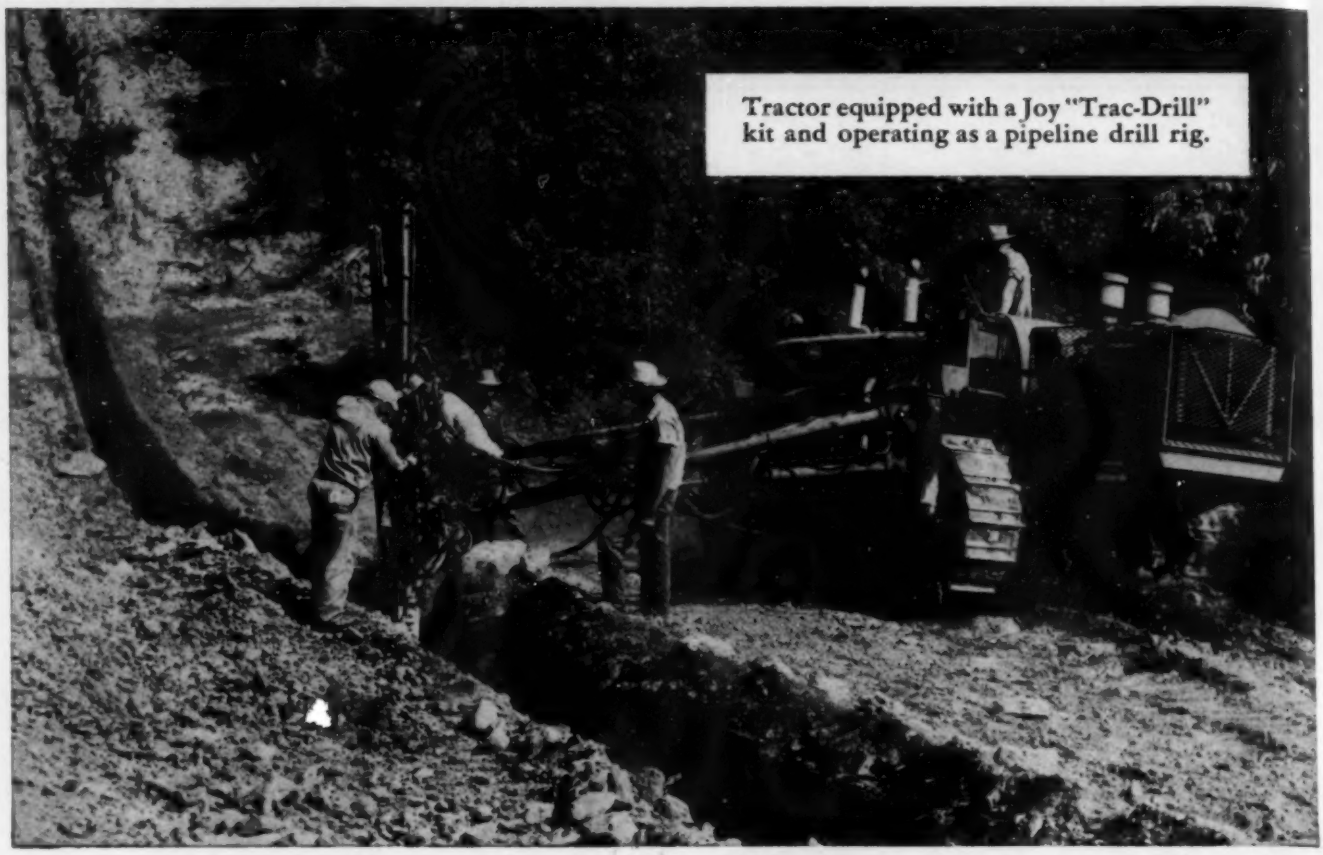
In the past this has been accomplished, and well, in our nation of free economy by the three principal segments of the gas industry—the producer, the transporter and the distributor. Evidence of this is the fact that 25 per cent of the nation's energy requirements are now furnished by natural gas as compared with less than 10 per cent in 1932—and the demand for more gas is still heavy.

But will it be met? The oppressive hand of federal regulation curled in a price-fixing clutch has been laid upon the producer. His is a business beset with chance and there is sharp competition between thousands of producers for the sale of their gas. But despite no monopoly, the producer is told that his sales destined for interstate commerce will be regulated and subjected to price-fixing. Yet he is given no compensating advantages, such as a protected market, normally afforded regulated public utilities. Heavy risks without commensurate return!

There it is. Price control by government in a land of free economy. Such has historically led to stagnation—loss of initiative—dwindling supply. This intolerable situation affects us all.

When one leg of the stool is shortened, the whole stool becomes shaky.

HOUSTON CONTRACTING COMPANY
General Contractors
Laurence H. Favrot • R. P. Gregory • Geo. A. Peterkin
OIL • GAS • GASOLINE • WATER PIPE LINES • 2707 FERNDALE, HOUSTON 6, TEXAS



Tractor equipped with a Joy "Trac-Drill" kit and operating as a pipeline drill rig.

THE JOY "TRAC-DRILL"

A PIPELINER RIG THAT GETS THERE FASTER TO SAVE YOU TIME AND MONEY

This PIPELINER, the Joy "Trac-Drill," is a packaged drill-and-compressor unit for pipeline drilling that is easily assembled on *your* tractor. The assembly kit consists of drill and compressor "packages" and instructions for assembly. Drill package includes Joy Silver Streak Drills, Hydro Drill Jibs, mounting bracket, hydraulic pump and other accessories. Compressor package includes a Joy WL-80 compressor, mounting bracket, air receivers, etc.

Two drills are mounted on dual, hydraulically-actuated Joy Hydro Drill Jibs. With these jibs, the drills are quickly and easily positioned and are held absolutely stationary during drilling. This is a real "Pipeliner" rig . . . the double drill arrangement permits the drilling of several holes from each tractor setup.

The Joy "Trac-Drill" moves and operates as one self-contained unit. It moves in on those tough spots in the spread faster because there is no need to tow a separate source of compressed air into the area.

Consult a Joy Engineer TODAY for details on how you may equip your tractor for pipeline drilling. ● ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

ABOUT Stationary and Portable Compressors . . . Rock Drills . . . Rock Bits . . . Electrical Connectors . . . Portable Lighting Lines.

WAD C-5363

JOY

CONSTRUCTION EQUIPMENT MANUFACTURERS FOR OVER HALF A CENTURY

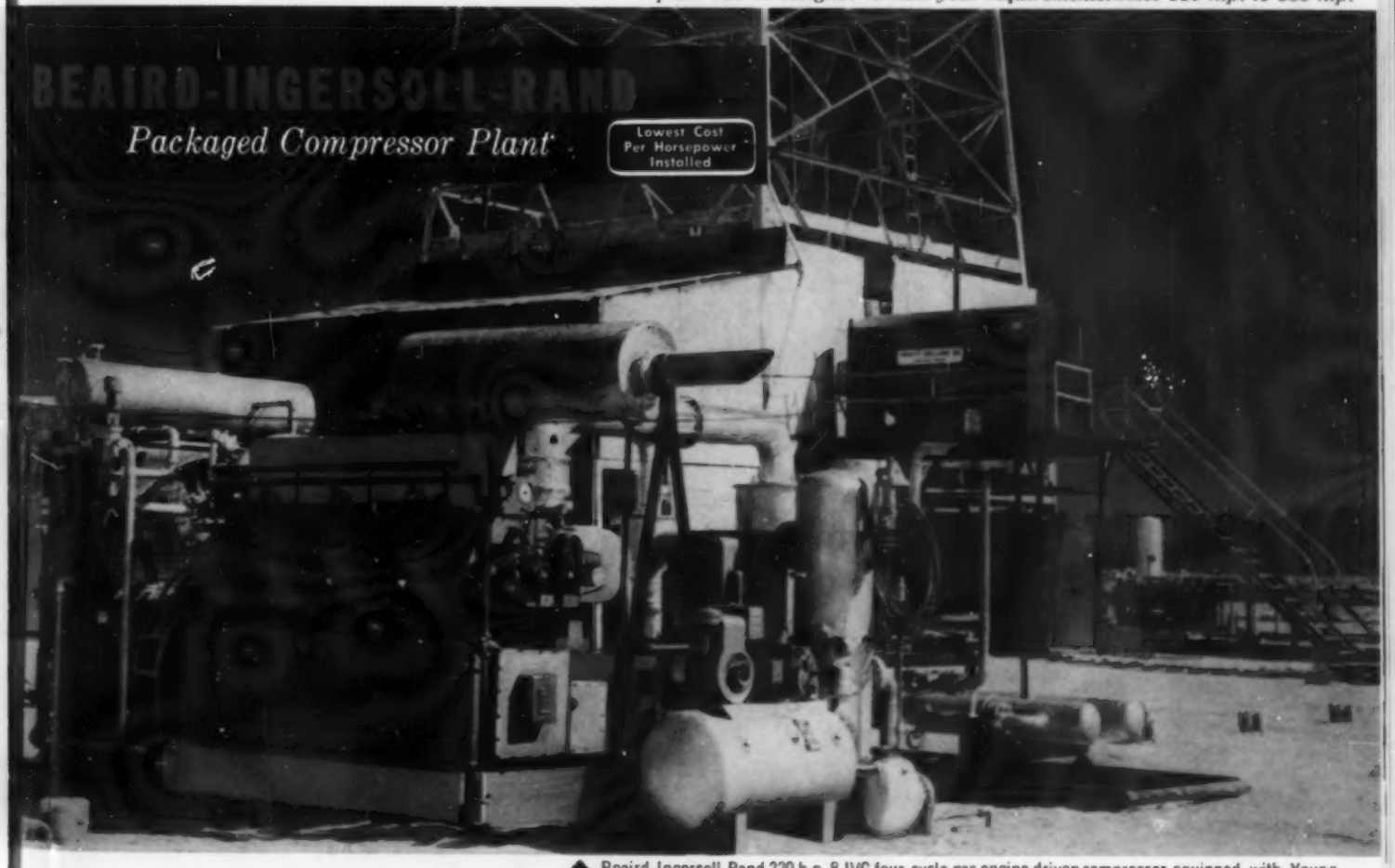
PACKAGED COMPRESSOR *SPEEDS* PENETRATION RATES ON TEST WELLS

OIL INDUSTRY TECHNOLOGISTS, investigating methods of reducing present-day drilling costs, recently started a series of tests using aerated mud. Of major importance to this program was the selection of a compressor. The unit had to deliver, automatically, full rated capacity over a wide range of pressures — to operate virtually unattended, leaving the crew free for regular duties. When moving it was essential that only oil field equipment be used and no special foundation required at the drilling site.

A Beaird-Ingersoll-Rand 4-Cycle Packaged Compressor Plant, 220 horsepower 8 JVG, was purchased by Phillips Petroleum Company for this task. Beaird engineers installed automatic controls that permit it to slow down or pick up speed over a range of 50% to 100% according to discharge conditions. A stop valve on the rig floor is all that is required to shut off air instantly for a connection or a trip. Other automatic controls safely handle this sudden change in operation — slowing the engine and unloading the compressor cylinders.

Mounted on its own heavy steel skid base, the compressor is set in a shallow pit near the rig and ballasted with sand or caliche. It moves as a single over-the-road package between drilling sites. On the new location only connections to fuel and mud lines are required to place it into operation.

Let us show you how a Beaird-Ingersoll-Rand packaged compressor plant can be designed to meet your requirements. Sizes 110 h.p. to 660 h.p.

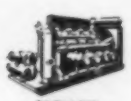


▲ Beaird-Ingersoll-Rand 220 h.p. 8 JVG four-cycle gas engine driven compressor equipped with Young radiator and all necessary equipment and controls on Phillips Petroleum Company's drilling rig.

THE J. B. BEAIRD COMPANY, INC.
Shreveport, Louisiana

BEAIRD

MACHINING • MANUFACTURING • STEEL WAREHOUSE


PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

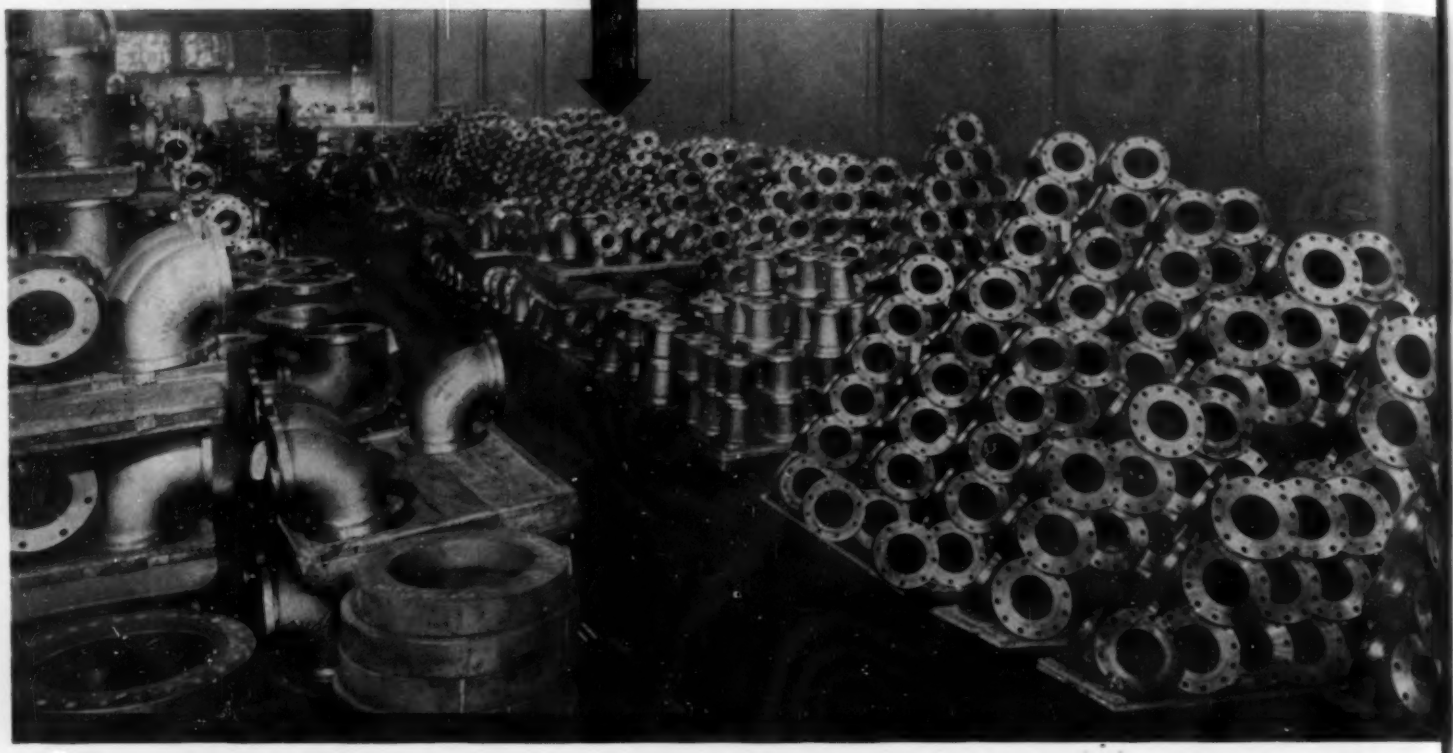
PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS

BEAIRD *Cast Steel Fittings* Fittings that fit

Fittings off the shelf



That's right . . . Beaird has a complete stock of standard fittings available to meet demand!

Now, you can avoid costly delays and downtime by requesting DIRECT SHIPMENT thru your supply house or by calling us direct! Fast delivery on special fittings too . . . from our large assortment of patterns.

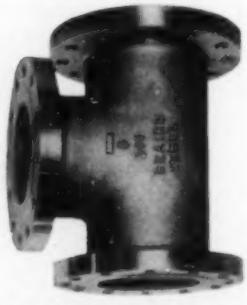
Speed up ordering by using the handy selection charts and figure numbers in Beaird's new Catalog No. 153 . . . write for your copy today!

Beaird also has complete facilities for manufacturing special items to your specifications.

Gasket Faces Machined with Fine Phonographic Finish

Why Beaird fittings are known for their true fit and high quality the world over

Flanges Fully Backfaced



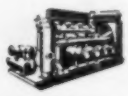
Bolt Hole Circles and Flange Circumferences Concentric with Bore

THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE



PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS

WHO'S MEETING WHERE

FEB.	
13–17	American Institute of Mining and Metallurgical Engineers, Conrad Hilton Hotel, Chicago.
13–18	A.S.T.M. Committee D-2 on Petroleum Products and Lubricants Rice Hotel, Houston.
16–18	National Association of Corrosion Engineers, Sixth Annual Short Course for Pipeliners, Mayo Hotel, Tulsa.
25	National Gasoline Association of America, Permian Basin Regional Meeting, Scharbauer Hotel, Midland, Texas.
MAR.	
4	Southern Gas Association, Transmission Management Conference, Shamrock Hotel, Houston.
7– 9	Mid-West Gas Association, St. Paul Hotel, St. Paul, Minn.
7–11	National Association of Corrosion Engineers, Palmer House, Chicago.
23–24	Pacific Coast Gas Association Accident Prevention Conference, Santa Barbara.
24–25	American Gas Association, Gas Supply, Transmission and Storage Conference, Wm. Penn. Hotel, Pittsburgh.
24–25	NEGA Annual Meeting, Hotel Statler, Boston.
APRIL	
5– 7	Corrosion Control Short Course, University of Oklahoma, Norman.
12–15	American Gas Association Distribution, Motor Vehicles and Corrosion Conference, Netherland Plaza, Cincinnati.
18–19	AGA Residential Gas Section, Eastern Natural Gas Regional Sales Conference, Hotel William Penn, Pittsburgh.
19–21	Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.
20–22	Indiana Gas Association Annual Meeting, French Lick Springs Hotel, French Lick, Ind.
20–22	Petroleum Industry Electrical Association and Petroleum Electric Supply Association, Joint Conference and Exhibit Show, Shamrock Hotel, Houston.
MAY	
9–10	American Gas Association, Gas Supply, Transmission and Storage Conference, Hotel William Penn, Pittsburgh.
11–12	Pacific Coast Gas Association, Gas Supply and Transmission and Conference of Technical Session, Palm Springs, Calif.
16–18	American Petroleum Institute, Division of Transportation, Products Pipe Line Conference, Edgewater Beach Hotel, Chicago.
30	Chemical Institute of Canada, Quebec City, Que.

Use the Readers' Service Cards in this Issue

For more information on the advertised products in this issue, make use of the post card just inside the back cover. Circle on the post card the code number of the item desired. Your request will be forwarded to the manufacturer and the material will be mailed directly to you. Use the post card also to obtain material on the new equipment and literature items reviewed in this issue by circling the editorial code numbers at the top of the post card.

RUST-BANS STOP CORROSION

Inside or out—in any climate—on storage tanks or finely-machined parts—you can depend on Humble RUST-BANS to stop corrosion.

Industries of all kinds in 28 different countries around the world are solving their corrosion problems with the RUST-BANS, and other products in Humble's complete line of protective coatings.

Humble makes a family of protective coatings for use in a variety of locations—even under severe working conditions.

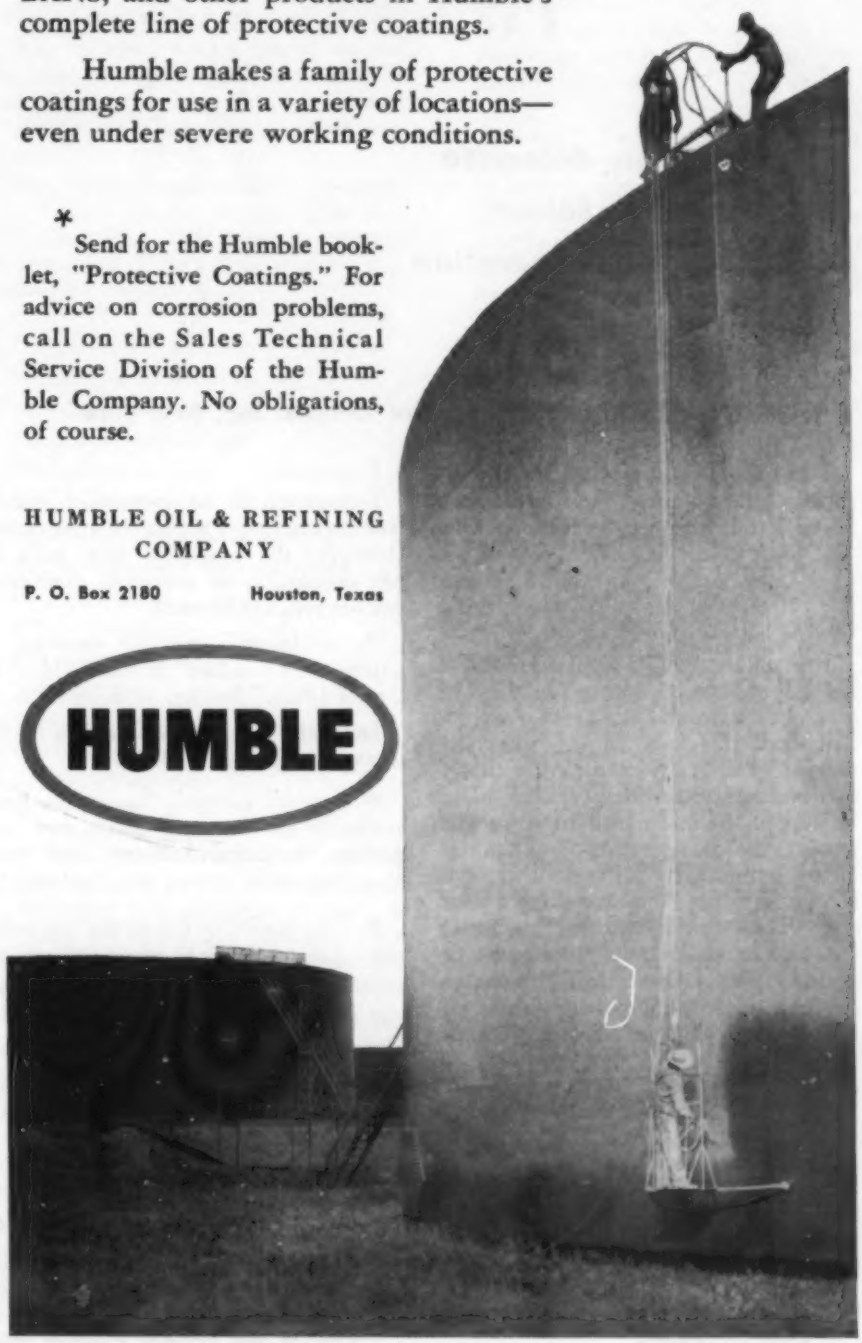
*

Send for the Humble booklet, "Protective Coatings." For advice on corrosion problems, call on the Sales Technical Service Division of the Humble Company. No obligations, of course.

HUMBLE OIL & REFINING COMPANY

P. O. Box 2180 Houston, Texas

HUMBLE



3 Ways to Shed the Detail Problem

1. You can delegate
2. You can select
3. You can streamline

By AUREN URIS, Research Institute of America, Inc., New York

DETAIL CAN BE deadly because it sneaks up on you. A short time may be all it takes to see the change. One day, everything is under control. A week later, you're going down for the third time in an ocean of paper work, routine followup, and so on.

Every executive is familiar with the quick-breeding aspect of detail. Details cluster around the average executive desk like iron filings around a magnet. And it's human nature to try to overcome the difficulty by wading in with phone and pen flying. For this reason, the chances are good that as of this moment, a considerable amount of routine could be removed from your shoulders. Not only would there be no loss as a result, but the increased time you could allot to more important matters would undoubtedly show up in better carrying out of your primary responsibilities.

Your Triple Defense Against Detail—

Every executive has available to him three means by which he can lighten the burden of routine. These should be applied in the following sequence:

... I. Delegate
... II. Select
... III. Streamline

I. DELEGATE

Delegation is an important executive technique. Putting it even more strongly: the executive who *fails* to use delegation is probably executing not his job, but himself.

As a farmer, wading through a patch of Canadian thistle said, "It ain't all hay." Neither is delegation.

Delegation can cause trouble if the *wrong* duties are handed over:

- Over-all control. No matter how extensive are the delegations you undertake, responsibility for final performance must rest on your shoulders.

- Responsibility for operating policies. You may call upon others to contribute, but you cannot expect anyone else to take the consequences in case of kickback.

- The hot potato. Don't make the mistake of passing one down the line just to take yourself off the spot.

On the other hand, the matters you *can* delegate are fairly recognizable.

Check up on the time you spend now—

... filling out routine reports, requisitions, etc., that could be handled by a clerk, secretary or other subordinate;

... making calculations and entries that a clerk or other subordinate is fully capable of doing;

... making routine checks—on inventory, for example—or other static situations which are basically a matter of ascertaining easily identifiable facts;

... running your own errands—which might be better turned over to a messenger boy or other subordinate;

... engaging repeatedly in certain simple mechanical tasks.

If you can reduce any of these to a matter of a final okay, a signature, or the dispatch of a messenger, they are probably suitable subjects for delegation.

More on Drawing the Line—

At some point, however, you may have to go easy on delegation. It's best to hang on to a chore, for example, if—

- It's too technical. Computing a cost or calculating production capacity may be simple for you, but completely beyond the capacities of a subordinate.

- The duties involve a trust or confidence. In some instances, for example, personnel files or records, cost data, or other highly confidential matter may be involved.

You may find that under certain circumstances it is possible to delegate duties involving initiative, judgment and decision. You may be on firm ground, but you have to consider these factors carefully:

The nature of the duty to be delegated;

The ability of the person whom you are considering to take over the job;

Your ability to keep control—that is, to keep posted on how well he carries out the job, and how quickly you can come to his rescue if he gets into trouble.

The time element is often an important factor. It sometimes helps to determine whether you can or can't delegate. Problems that don't have to be solved by a given deadline are worthwhile subjects for delegation. The top executive who's having a tough job with a customer may turn over that specific customer-relations problem to a subordinate for consideration and suggested solutions.

You can save yourself the wear and

tear of detail work by using the delegation device if—

. . . you make a point of knowing just what your subordinates' abilities are;

. . . you make full use of the collective abilities of the people in your department; (Sometimes no single individual may be able to take over, but a two-man team might provide a perfect solution.)

. . . you avoid taking up new problems or undertaking new procedures yourself without first asking: "Is this something that could be better done by one of my staff?"

II. SELECT

An office manager recently passed the word along to the head of his automatic addressing machine department: "Check your #3 machine for a broken selector pin."

The supervisor did as directed. To his astonishment, he found that the pin on that machine actually was snapped off short.

There was no witchcraft involved. A sound executive procedure made it possible for the manager to put his finger on the trouble spot.

Frederick A. Taylor, father of scientific management, referred to the method as the "Exception Principle." It's a method of control by checking the *deviations*, the *exceptional* cases.

The bit of magic performed by the office manager had a logical explanation. He had received complaints through his customer relations department about non-delivery of addressed material. All the complaints had come from one area. Since he knew the machine that handled the addressing operation for that area, he reasoned it was that machine that was at fault. A broken selector pin seemed the most likely explanation.

Basically, the Exception Principle boils down to, "Check when things go wrong." But to get the best results from the method, it must be systematized.

Keep in mind that it can't be applied to every type of work. Some authorities recommend using "Control by Exception" only if:

- The exception doesn't turn up too late, that is, if remedial steps will still be inexpensive.

- You can set up a standard. To recognize an exception, you must be sure what "normal" activity is. In one company, for example, the executive set up a maximum of 5 percent rejects as "normal." If sub-standard material went above this figure, the matter called for immediate investigation.

- You can get a report of results. You must be able to arrange to have a subordinate inform you of irregularities. This way, your time isn't wasted in the unnecessary routine of checking everything.

III. STREAMLINE

"Reports, reports, and more reports. Reports are making me snow-blind!"

You've undoubtedly heard one of the most common complaints made by executives with the detail problem: "Routine reports are the big time consumer."

For your own amazement, you might like to list all the reports that pass through your hands—either outgoing or incoming. Here's a sample list suggested by one executive:

Daily production record
Weekly production records
Monthly production records
Purchasing requisitions
Purchasing records
Payroll information
Subordinates' operating problems
Subordinates' written suggestions
Cost estimates
Progress reports
Development reports
Sales figures
Inventory reports
Operating cost figures
Special information

In your case that may be only a fraction of the report avalanche.

Anything you can do, therefore, to simplify the forms that pass over your desk—in either direction—is bound to cut down the load.

Of course, when forms originate with other executives, you may be limited to passing along your suggestions for simplification. But in most cases, they'll be receptive. They may have as much to gain as you do.

Here's a brief checklist of standard methods used to streamline report forms. You may want to run through them quickly to see whether any can be used to advantage in the reports you handle.

☐ **Both sides?** It's often practical to use both sides of a card or sheet, thus reducing the size of the form by half. A two-sided form generally requires a heavier paper stock to avoid show-through.

☐ **Standard information?** Fill-in material that has to be entered repeatedly can sometimes be made part of the form itself. Check: department names or numbers, codes, symbols, etc.

☐ **Punching?** A spindle file, or binder may be the best way for you to file a given form or record. Prepunching of the form by machine makes this method of filing easier.

☐ **Scoring?** Perforation makes it possible to retain the essential part of a form, and discard the balance. Where two forms have to be kept together, only *temporarily*, scoring makes it possible to send each on its respective way.

☐ **Check-mark entries?** Where the information required is a simple choice—Yes or No, for example, or Accepted or Rejected—it's easier to place check marks in a box than to write answers.

☐ **Vertical or horizontal?** Some information is better running up and down on a form, rather than reading from left to right. Addition and subtraction are easier if the figures are vertical. But entries that may have to be read after a form is filed will fare better running horizontally across the top of the form.

Up-to-Date?—

A periodic review of your executive workload is the surest way to keep the detail problem under control. Don't take it for granted that because you licked the job yesterday, you're rid of the problem today, or if you don't have the problem now, it won't be strangling you tomorrow.

And here's a final important point. Keep in mind that the detail that bogs you down can be a valuable ingredient of someone else's job. You can use routine duties as a means of training subordinates, preparing them for expanded duties, providing a testing laboratory for ideas and ingenuity.

—The End

Pipeliners Fight 17-Foot Tides in the Bay of Bombay

They laid 90,000 feet of submarine lines despite a pesky Indian god called Rajpramukuh and swift tides that turned the bay into mud flats, leaving barges and pipe high if not dry.

By **DONALD M. TAYLOR,** Editor, PIPE LINE INDUSTRY

GETTING A NATIVE GOD off the right-of-way is just one of the minor problems involved in laying submarine pipe lines in India.

This was the experience of Sammy Collins, president of Collins Construction Company of Port Lavaca, Texas, which, along with Merritt-Chapman & Scott, Inc., just finished laying 90,000 feet of underwater lines from Pir Pau on the mainland of India out to and across Butcher Island in the Bay of Bombay.

They laid seven lines in the 40-foot maximum depth water which ranged in size from 8-inch to 24-inch. Built for the Port of Bombay Trust, the lines will enable tankers to service the Burma-Shell and the Standard Vacuum refineries during the monsoon period.

The job was completed in record time despite some of the most difficult and oddest handicaps ever imposed on a pipeliner.

Time and Tide. There was the matter of tides. They ranged from mild 6-foot neap tides to extreme tides just under 18 feet. The latter often would leave pipe lines, men, and barges marooned in the mud. This was a hazard known in advance. And Collins laid his plans to cope with it.

But there were many unusual hazards and Collins, who has such record-breaking jobs under his belt as the crossing of the four-mile-wide 250-foot-deep Straits of Mackinac, describes the job as one of the toughest yet.

"It had almost as many surprises as Russian roulette," he says. "Some of them were almost as dangerous. Our divers recovered two live bombs from beneath the underwater ditching machine. There's no telling how many we missed. Maybe they weren't dangerous. But try to tell that to a diver.

DIVER CLINGS TO POLE on top of underwater jetting machine used to bury seven 12,500-foot long pipe lines in Bay of Bombay to depth of 6 to 8 feet. Diver is Jean E. Johnson, marine superintendent of Collins Construction Company. The jetting machine uses high-pressure water to undercut pipe and high-pressure air to jet spoil from ditch.

TIDE IS IN as one of the 24-inch lines rolls off launching unit into the slack waters of the Bay of Bombay.

TIDE IS OUT and water has receded more than 2000 feet. Pontoons have been removed from line. It lies on muddy bottom of bay. Notice stranded barge in background.

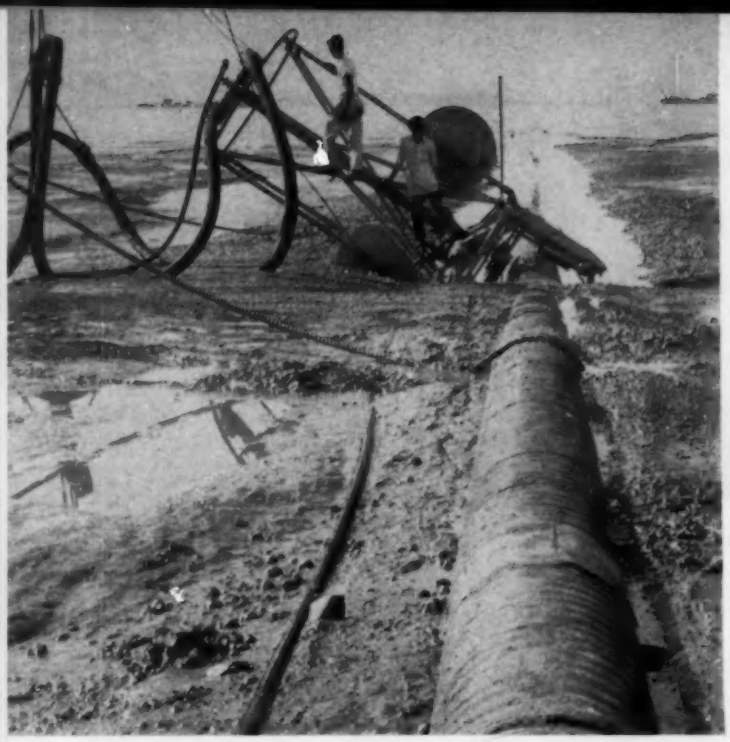
"Another surprise was the native labor," he says. "We knew we would have trouble making them understand us through an interpreter. But we found that at times the natives couldn't understand each other. There are seven or eight different languages spoken in India, not to mention numerous dialects."

Snakes Alive! Cobras presented another hazard for the Texan and his crew. Once when his forces were preparing to pour some pipe piers on Pir Pau, a live cobra was discovered in the six-foot excavation. When Collins ordered it killed, the natives all but mutinied. They believe in killing no living creature. At the end of the day the pier wasn't poured.

Collins decided to outwit the natives and get on with the work. He ordered some men on the job before work time in the morning with instructions to kill and bury the cobra before the natives arrived. But the natives had outwitted him by building a ladder for the snake during the night and allowing it to escape.

"Aside from finding the bombs, the most unusual things that happened on this job—fortunately were on land,"

TIDE IS IN and the barge is jetting the line. This jetting equipment undercuts the line and lowers it approximately three feet per pass.



JETTING MACHINE and barge stranded by outgoing tide.

OUTGOING TIDE reveals ditch made by one pass of jetting machines.

says Collins. "One incident, vexing at the time, now seems amusing. It concerned the moving of one of the native temples on Butcher Island.

"This temple was the home of a god named Rajpramukuh—who was nothing more than an ordinary rock the size of a man's fist. The temple was modest—about three feet square—but it was directly in the path of a line we were laying.

"When the natives refused to let me move the temple, I sold them on the idea of building him a larger one some distance away. After much discussion, they agreed and we built a temple twice as big and decorated it with colored glass. The priest from Pir Pau moved the 'god' to its new home one afternoon. But the next morning he was back at his old stand.

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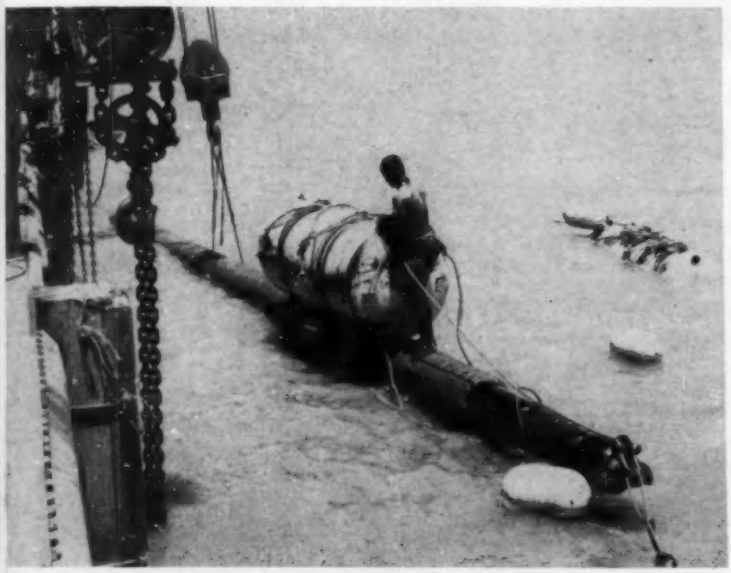
" 'What—destroy his freedom!' We ran the lines around the temple."

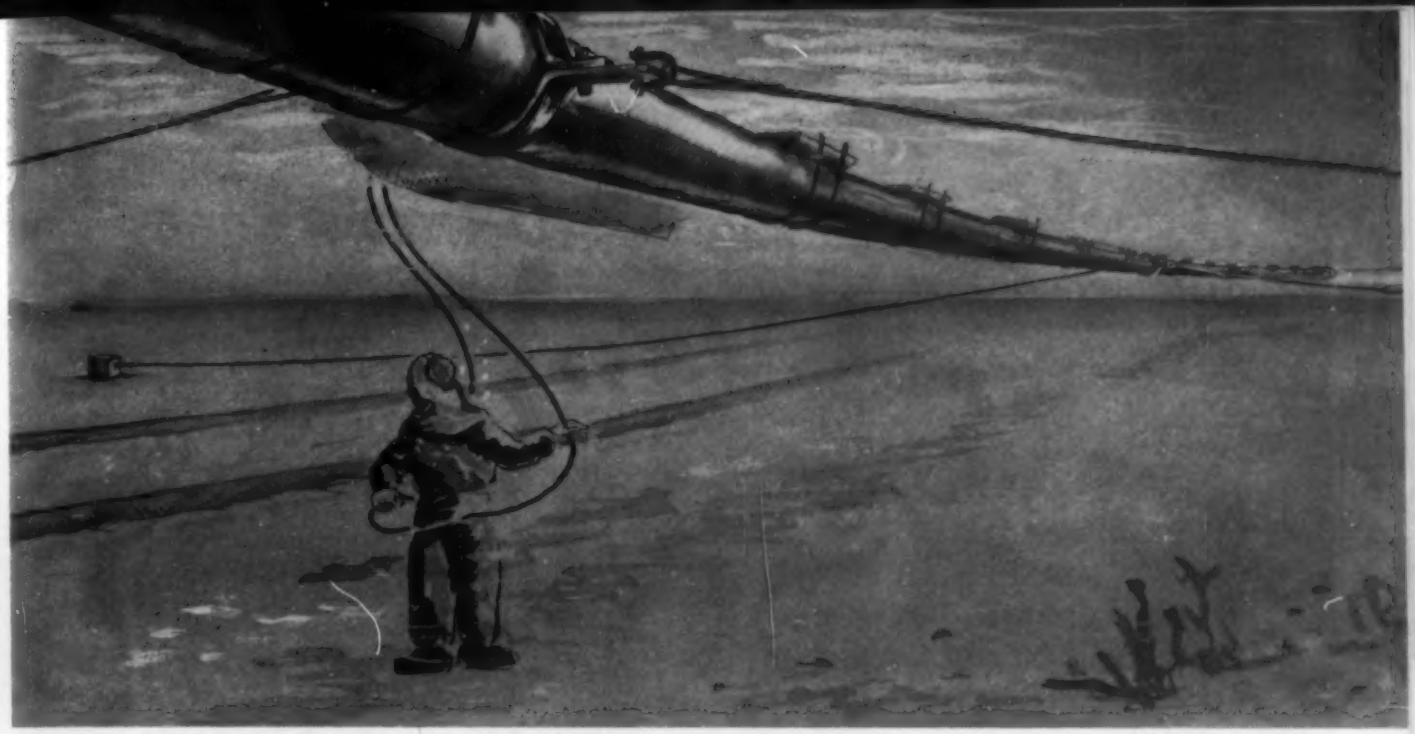


FIELD MOLD applied after tie-in weld is completed.

NATIVES REMOVE pontoon before the tie-in.

Most tie-ins made during neap tide . . .

The sections of pipe were launched from the ramp 1200 feet at a time during slack water period and towed to position in the line. They were latched into place and partially or wholly submerged by releasing the pontoons. Collins made the tie-ins on days when mild neap tides were expected, using two barges in the conventional manner. Two sections of overlapping pipe were hoisted above the water until they were horizontal and level. Then they were beveled and welded. After the weld had been inspected coating was applied and followed by a concrete field mold. The pipe was then lowered-in on range.



LATERAL CONTROL OF THE LINES was effected by the use of concrete blocks and clamps.

How they whipped the tides . . .

During the swift ebb and flow of the tides the bulky pipe and pontoons presented a large broadside to the currents. This made it difficult to control the pipe with tugs. Collins pipeliners worked out this method for lateral control.

They cast five-ton reinforced concrete anchor blocks and, using shore-based ranges, spotted them 500 feet apart down the length of the seven pipe lines and 500 feet on either side of the center line. To these blocks they clamped 850-foot-long lengths of wire rope. Using the ranges, they positioned clamps on the free ends to coincide with the centerline of the individual line being laid.

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BOMB DISCOVERED UNDER PIPE. This live bomb was one of the unexpected hazards encountered by divers in the Bay of Bombay. It was one of two 65-pound anti-submarine bombs that Collins pipeliners uncovered in jetting the lines. The bomb was of World War II vintage.

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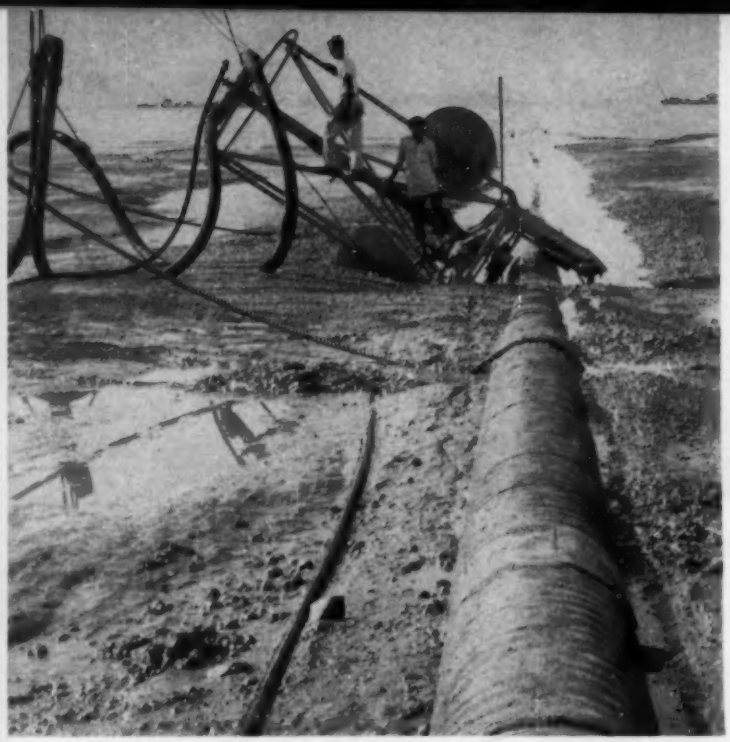

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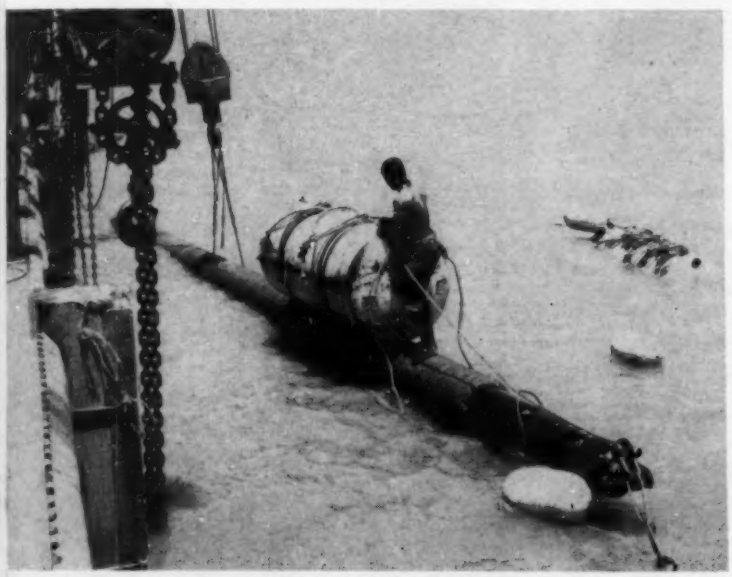

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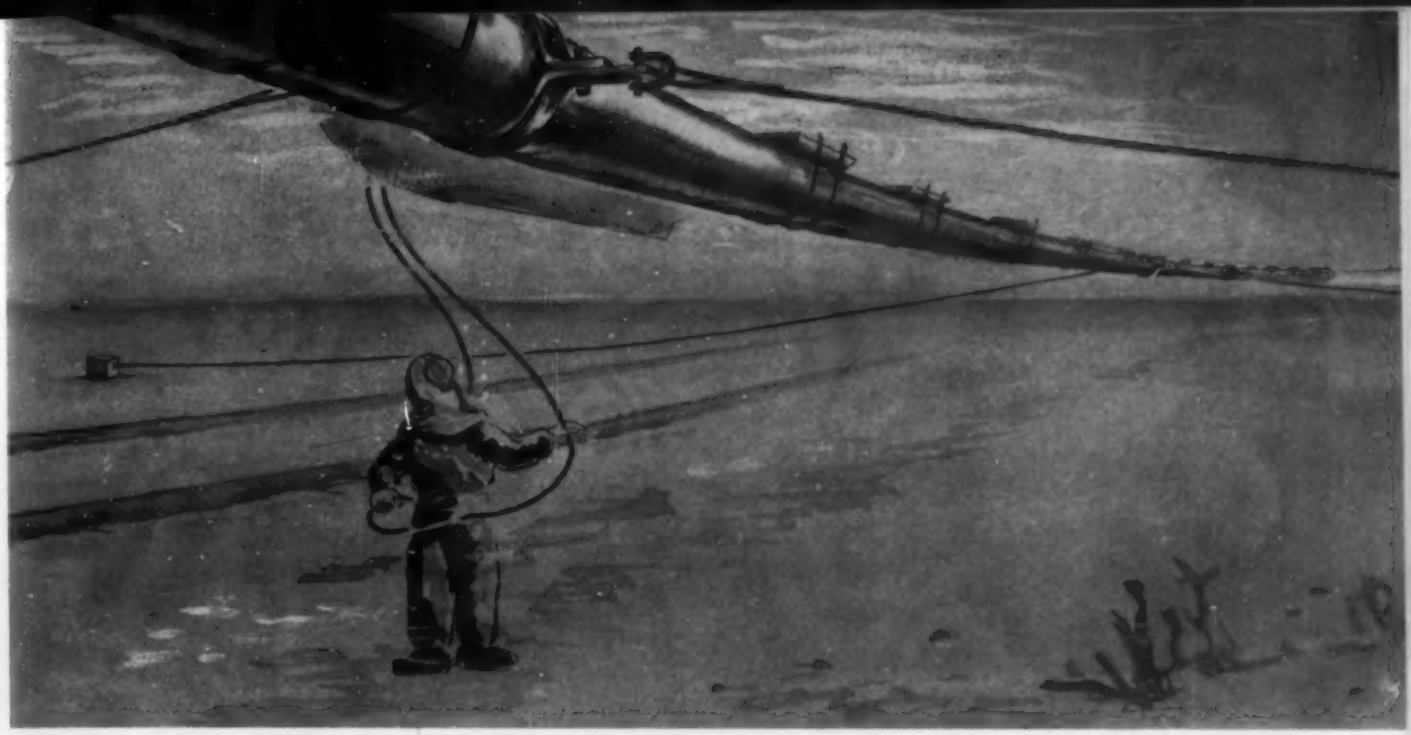

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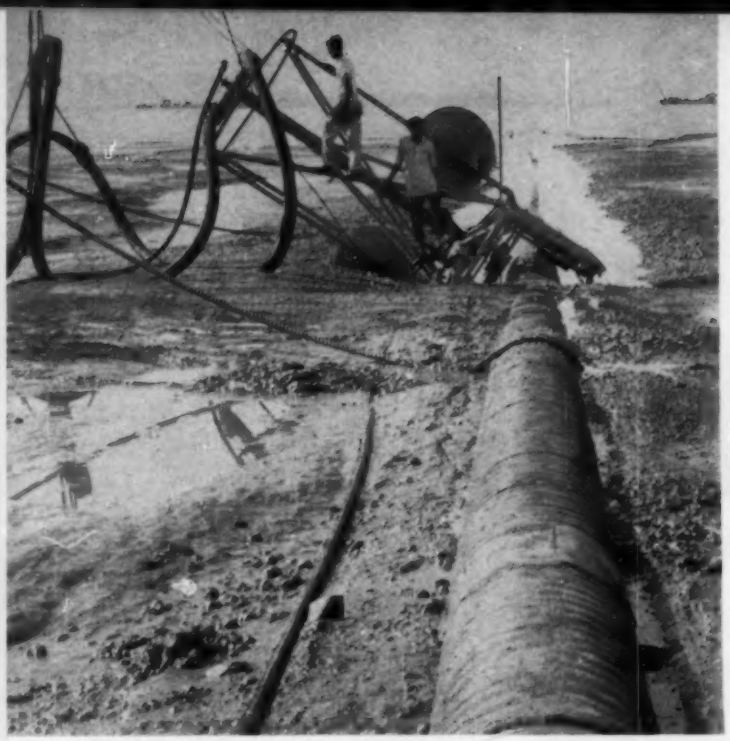

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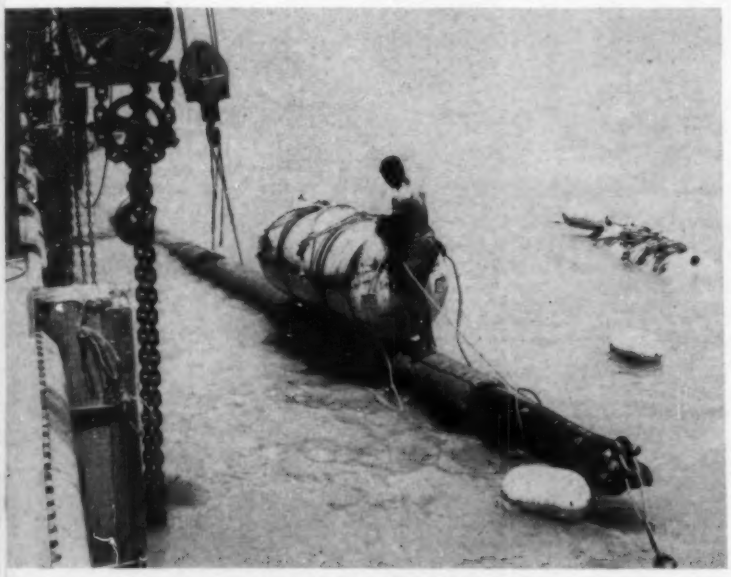

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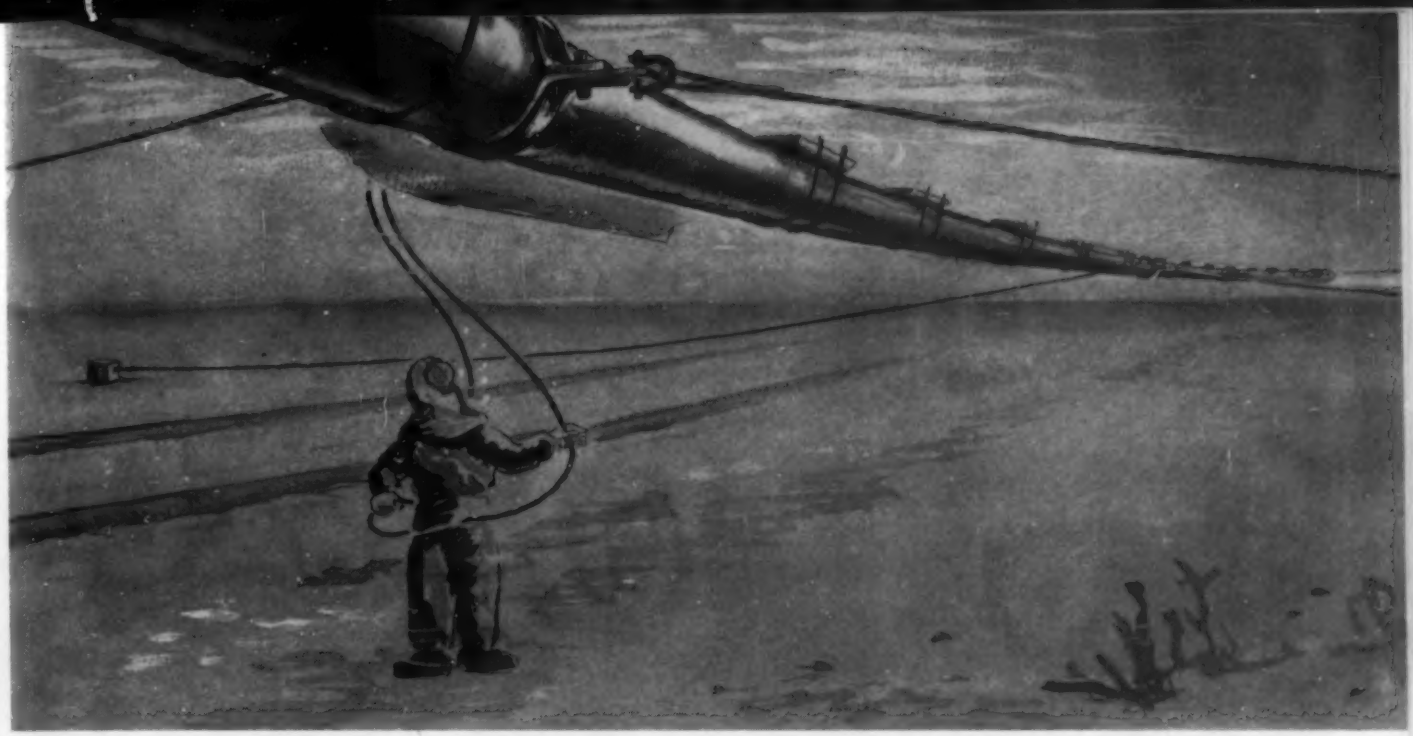

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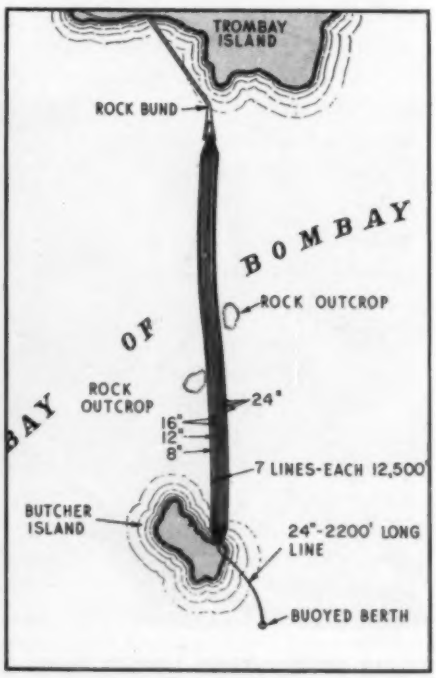
NATIVE STEADIES PONTOONS to keep eight-inch screw line from backing off.

CONCRETE FIELD MOLD was coated with dope to protect it from water.

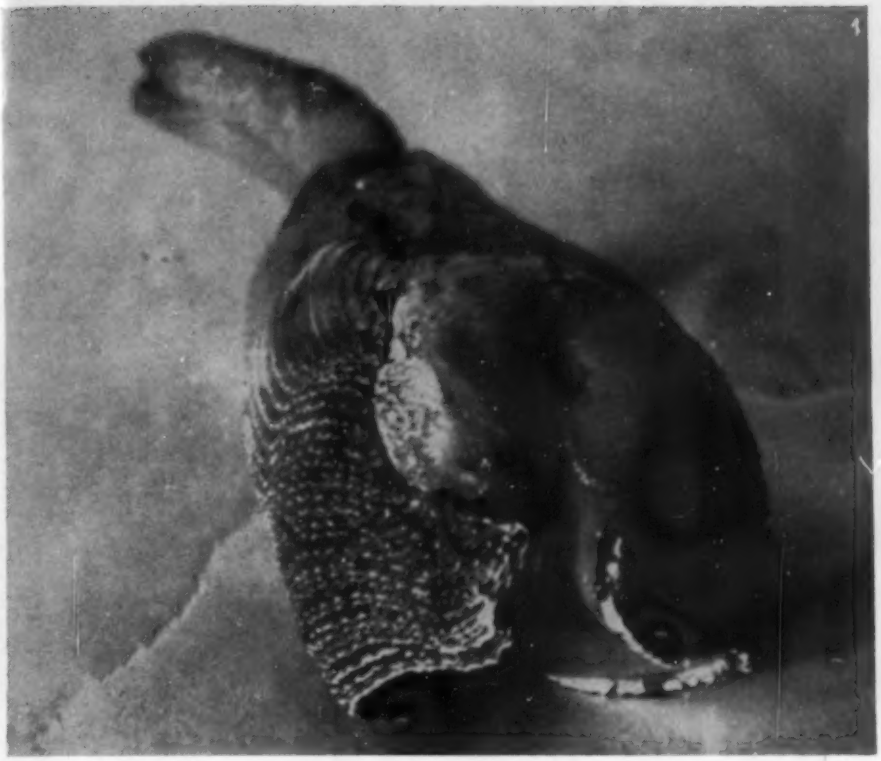
Laying the eight-inch line . . .

Surprising enough, one of the most difficult tasks was the laying of the eight-inch screwed line. The line had an inner liner of bitumen and each joint had to be made up tight enough to jam the liners together. Then when the lines were launched, the pontoons on top of the pipe had to be supported by hand to keep them from flopping over and loosening the pipe. Like all of the other pipe on this job, this line was coated with a double-glass fiber wrap with coal tar enamel. This was covered with 1½ inches of concrete as were the 12-inch and two 16-inch lines. The three 24-inch lines were coated with 2¼ inches of concrete in the Collins pipe yard.

SURVEYING SCENE. Sammy Collins, president of Collins Construction Company, looks over the job. His company did underwater pipe line work last year in North America, South America, Africa and Asia.



THIS MAP shows route of the seven pipe lines in Bay of Bombay.

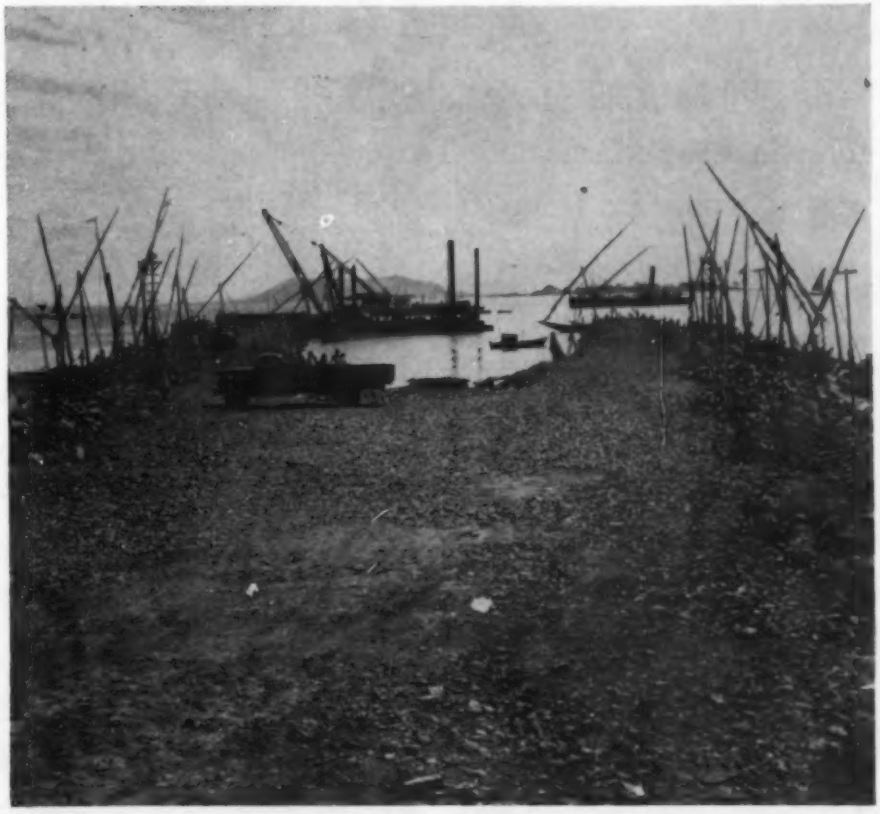


This little marine marauder..... prompted this

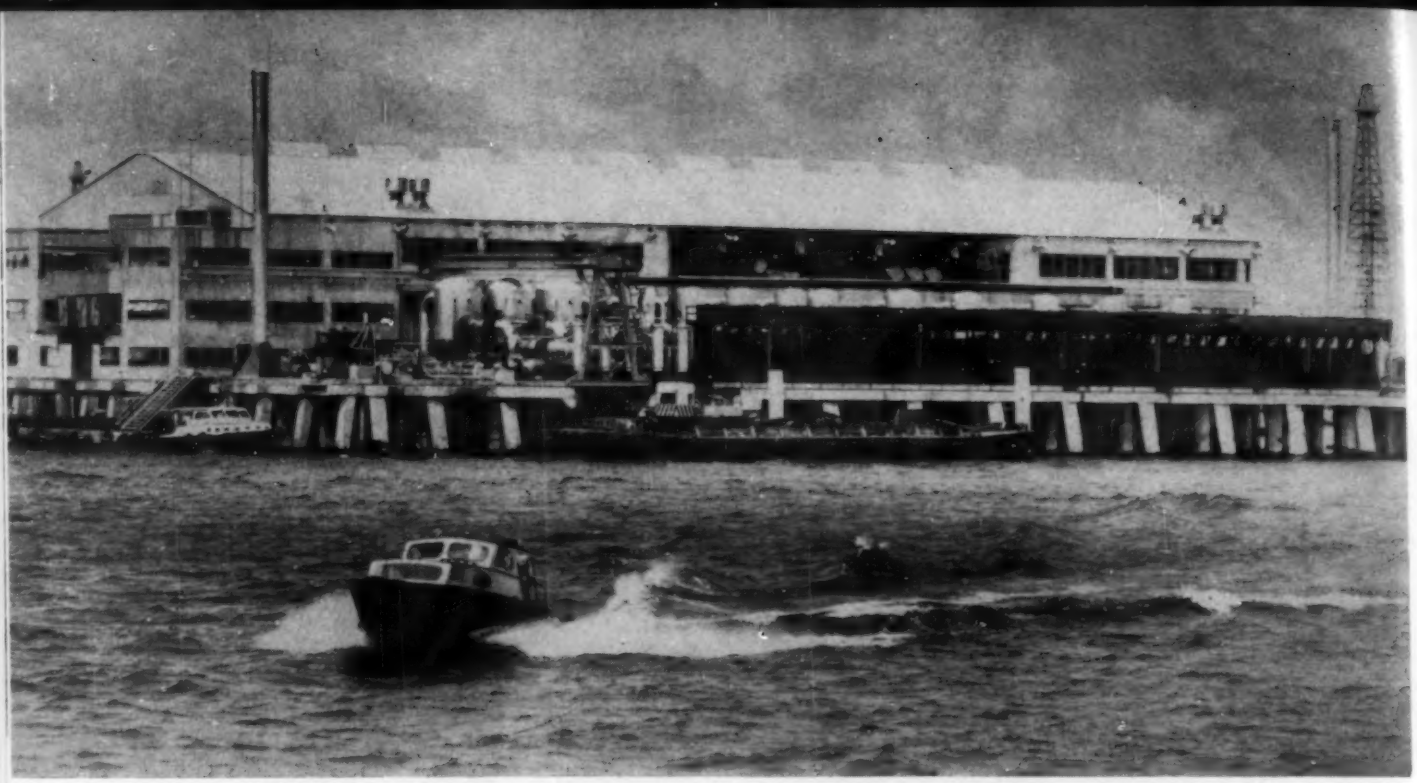
The pholas is one of the most efficient rock drillers in the world. It attaches itself to a rock at birth and starts drilling. Never stops until it dies. Drilling operations call for little effort. The mere process of inhaling and exhaling water is sufficient to give the animal's rasp-like body a slight twist. This small movement repeated millions of times enables the pholas to penetrate as much as 24 inches of rock in a lifetime. It is claimed that it has even ground its way into pipe.

This marine organism can survive in mud only so long as its tail, which grows to about 18 inches, is in fresh water. This is why the rock bunds shown here were constructed. The lines were laid between the jetties and the space between them will become silted. This allows the lines to come ashore under several feet of cover.

—The End



THE PHOLAS, shown at upper left, is a marine organism which cuts through 10 to 12 inches of rock in a lifetime. It reputedly is capable of cutting into a steel pipe line. Because of this creature, rock bunds (Indian term for enbankment) were built. Virtually all the labor was done by native women workers (upper right) at 40 cents a day. The bunds which angled out on either side of the pipe line (lower right) permitted the lines to be brought to the surface beneath the mud and out of reach of the pholas.



GIANT COMPRESSOR STATION in Lake Maracaibo is built on a platform about the size of a football field 14 feet above the 60-foot deep water. The platform is supported by concrete piles driven into the lake bed. Piles and foundations for turbines were precast on shore.

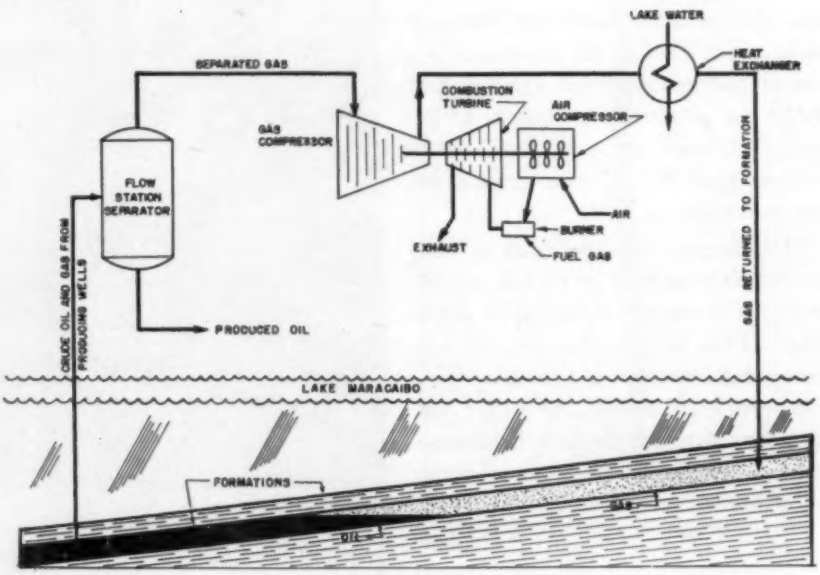
World's Largest Gas-Fired Compressor Station Opened

Creole plant built on piling-supported platform in Lake Maracaibo. Ten 6000-hp centrifugal compressors boost gas from 10 to 1935 psig.

A 60,000 HORSEPOWER gas-fired turbine compressor station was put into operation recently by the Creole Petroleum Corporation in its LL-370 area of the Boliver Coastal Fields of Eastern Lake Maracaibo in Venezuela. The compressor plant which is the largest of its type costs $20 million. It sits atop concrete piles in 60 feet of water.

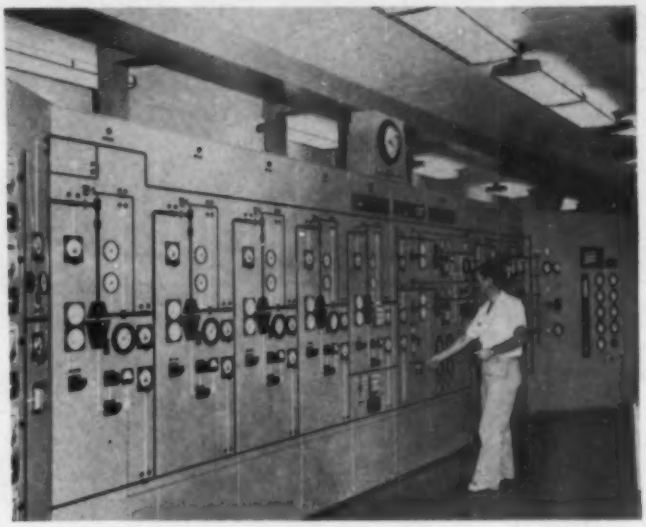
This giant plant is located seven miles from shore and in it are ten 6000 hp gas turbines driving centrifugal compressors which take suction at 10 pounds per square inch gage and discharge at 1935 psig. The plant handles approximately 137 million cubic feet of gas a day.

The purpose of this great undertaking is to repressure the oil field thereby conserving gas and also increasing the ultimate oil recovery by about one-third.



FLOW CHART of gas conservation plant. Gas is scrubbed between each stage of compression and cooled by lake water.

BATTERY OF TEN 6000-HP GAS TURBINES, largest concentration of such in the world, powers the compressors. Electric starting motors at lower right are 250-HP supplied by current from shore.

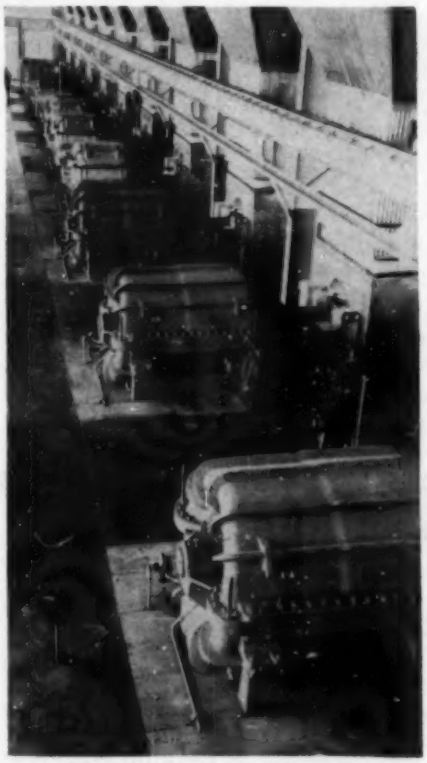


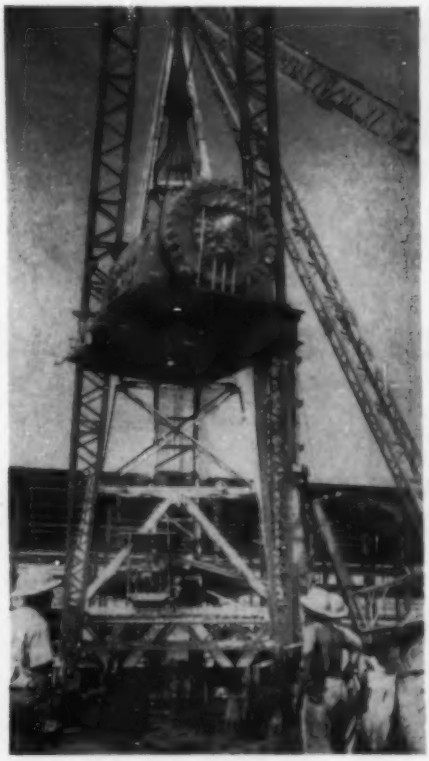
CONTROL PANEL OF STATION is 40 feet long. The schematic diagram on panel board follows the compression step-by-step indicating pressures, valve positions, turbine speeds, etc.

This plant was designed and constructed by Brown and Root, Inc., of Houston.

The gas is compressed in seven stages, the first stage being effected by three of the compressors and the second stage by two compressors. The remaining five stages of compression are effected by one compressor each.

One of the unusual features of this plant is that it is entirely pile supported. The 350 concrete piles that measure 28 inches on a side and are 165 feet long support the 329-feet long by 143-feet wide platform. These piles weigh about 70 tons each. Of these piles, 239 were driven vertically to carry the weight of the structure and the remaining 111 were driven at an angle to keep the structure from swaying. The concrete floor slabs, which were also pre-cast along with the piling, weigh approximately 100 tons each.





STATION SCENES. The battery of centrifugal compressors (left) driven by gas turbines is capable of producing 2000 pounds discharge pressure. The pressure serves a double function of re-injecting gas into oil reservoir below lake's bed and at the same time permitting Creole to recover approximately 2000 barrels of condensate a day. Center is centrifugal compressor in air, on its way to offshore foundation. Concrete pile (right) is being trimmed for length. These square piles measure 28 inches on each side and are 165 feet long.

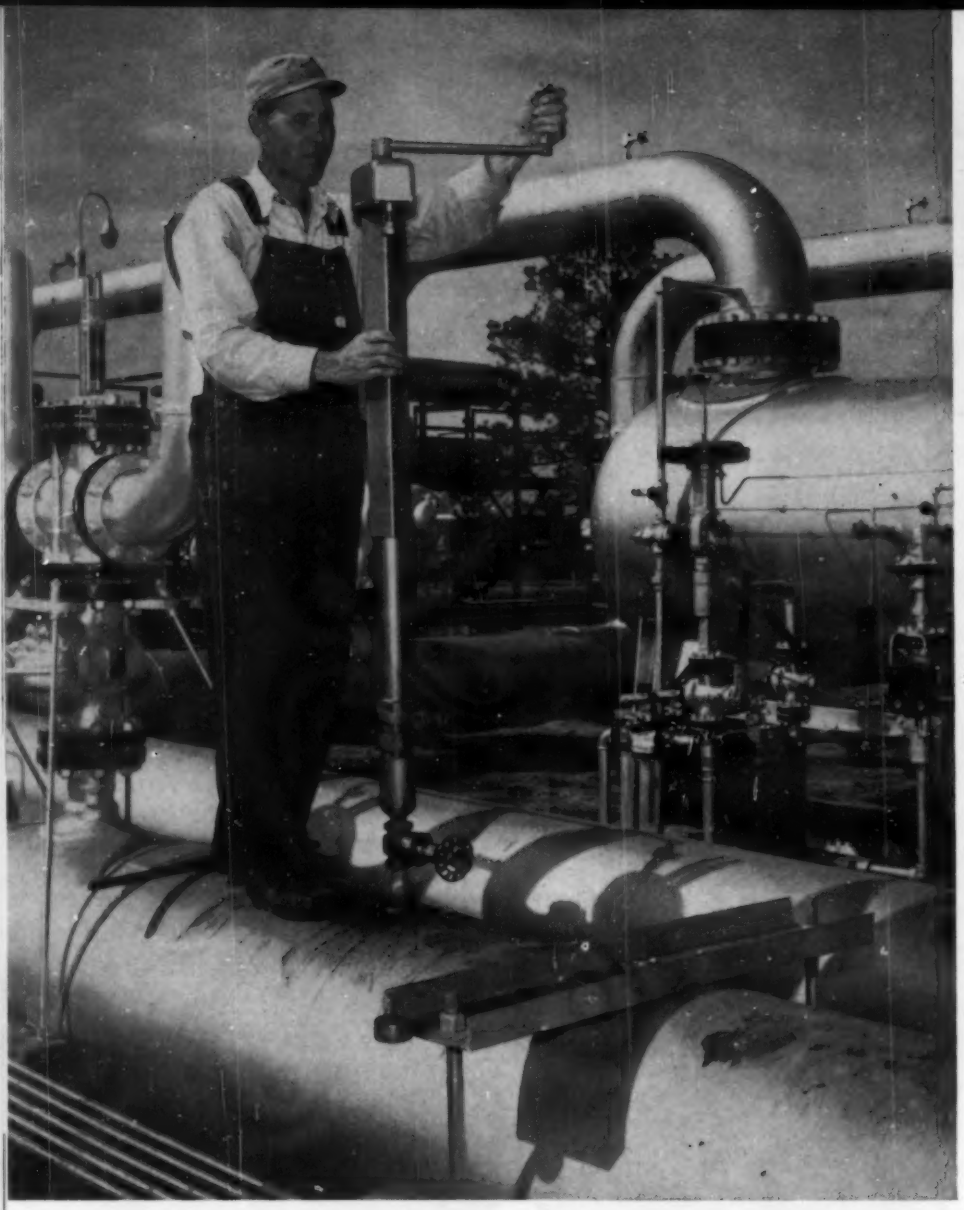


Fig. 1—Machines are available now for making hot taps from one-half inch through 24 inch . . .

Fig. 2

Hot Tapping Comes of Age

New techniques have changed this operation from a crude and dangerous undertaking to a highly technical science with unlimited possibilities.

By **JAMES H. McBRIEN,** Sales Engineer,
Tod Pazdral Pipeline Specialties, Houston

THE TECHNIQUES of hot tapping have evolved in the past few years from crude and dangerous operations with limited capabilities to a highly technical science with unlimited possibilities. Jobs which are now being done in complete safety were once impossible. But there are still details finements, temperature and pressure operation of this type.

Development of tapping machines deserves a closer look—their refinements, temperature and pressure limitations, and evolution from crude tools. An early method of making side

connections to a pipe or vessel under pressure is shown in Figure 3. A diamond point chisel was used to cut a circular groove practically through the pipe wall in the desired location. A nipple and valve were welded or bolted on. Then the grooved section of pipe was knocked out by hitting a steel bar with a sledge hammer or piece of pipe extended down through the valve.

This method was successful, strangely enough, a large percentage of the time. But high pressures made it dangerous. Often times the force of escaping gas or liquid would blow the knocked out coupon several hundred feet in the air with the sledge hammer going in one direction and the knockout bar in another.

Improvements were made on this procedure by adding a stuffing box around the knock-out or pointed bar which was then screwed or bolted to the tapping valve. Still, the size of the tap was limited mostly to small diameters. Later, steel cutting bits were mounted securely between threaded bolts connected to the stuffing box and joined with a cross piece surrounding the bit. (Figure 4.) This provided a method of both rotating and feeding the bit by hand as it cut its way through the pipe.

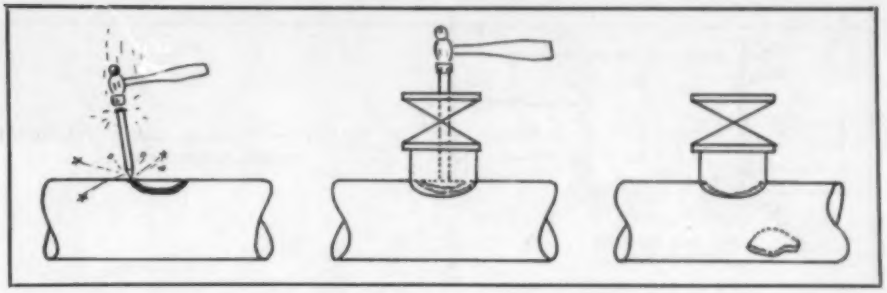


Fig. 3—Chiselling pipe and knocking out coupon with steel bar and sledge hammer.

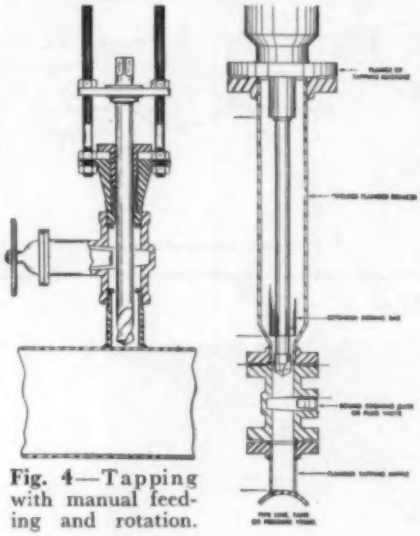


Fig. 4—Tapping with manual feeding and rotation.

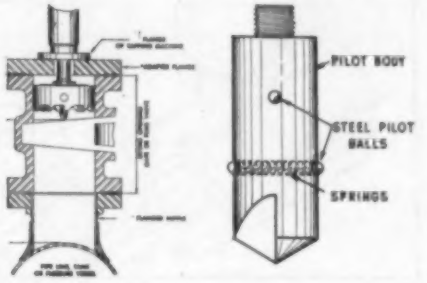


Fig. 5A (left)—Drills for taps of 2 inches and below.

Fig. 5B (left above)—Shell cutters for taps of 3 inches and above.

Fig. 6 (right above)—Pilot drill. Balls under spring tension snap out to retain tapped-out coupon.

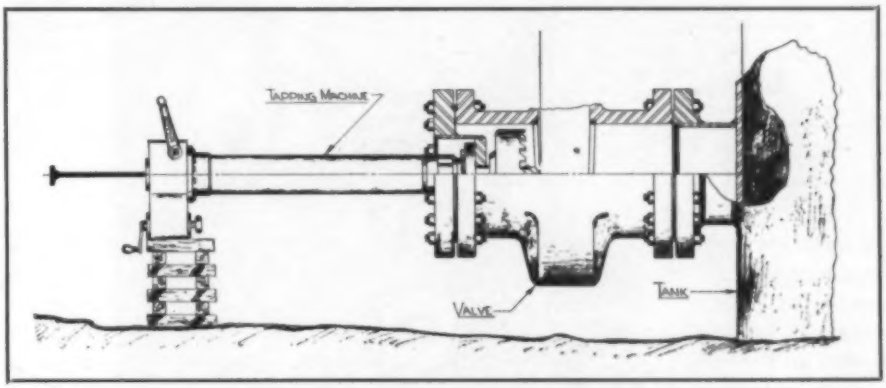


Fig. 7—Making 12-inch tap into storage tank.

Limitations of modern machines. These two basic functions, a lateral movement both in and out and a rotary motion necessary for drilling or milling through the pipe, are essentially what is accomplished by the modern tapping machines. This may be done by hand or mechanically, in most cases by air or hydraulically driven motors.

The ever increasing demands of the petroleum industry through the last few years have made it necessary for the manufacturers of the tapping equipment to increase and expand the operating limits of their machines. Machines are now available for making taps from ½-inch (Figure 1) through 24-inch (Figure 2). They are capable of tapping into pressures as high as 1440 pounds per square inch at temperatures of approximately 100° F. or up to 700° F. at 700 psi. Taps have been made where both these pressures and temperatures have been exceeded. But these are not recommended generally under normal operating conditions.

Most modern tapping equipment on all taps of 2 inches and below merely drill out the hole in the wall of the pipe, tank, or other vessel. (Figure 5A.) On taps of three inches and larger a section of pipe or a "coupon" is first milled out by a shell cutter and then withdrawn so that it will not remain in the line (Figure 5B). This withdrawal is accomplished by means of steel balls that are positioned in a pilot drill and expanded by spring tension (Figure 6). During the penetration of the pilot drill through the pipe wall the balls detent into the body of the pilot drill, then snap out when through to retain the coupon after the shell cutter has completed its milling operation.

Need for connections twofold. The reasons for making a hot tap connection will fall into one of two classes: (1) a permanent connection, or (2) a temporary connection.

Consider the material and general information needed and the necessary steps followed in making a normal hot tapped side connection which is to become a permanent part of an existing pipe line or tank (Figure 7).

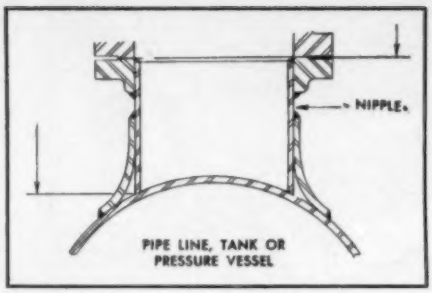


Fig. 8 (left)—Welding saddle reinforces nipple connection.

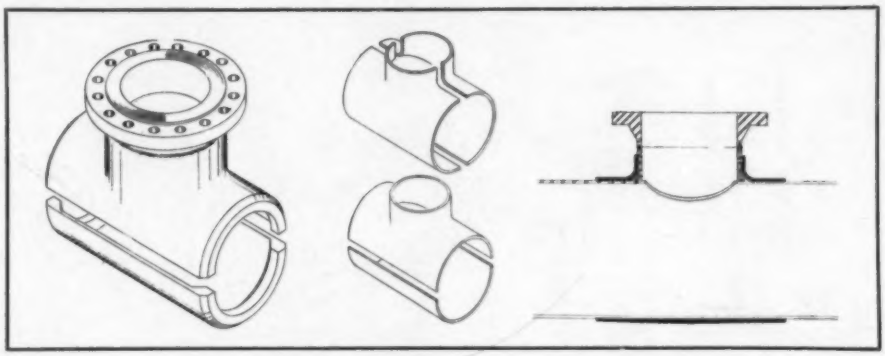


FIGURE 9

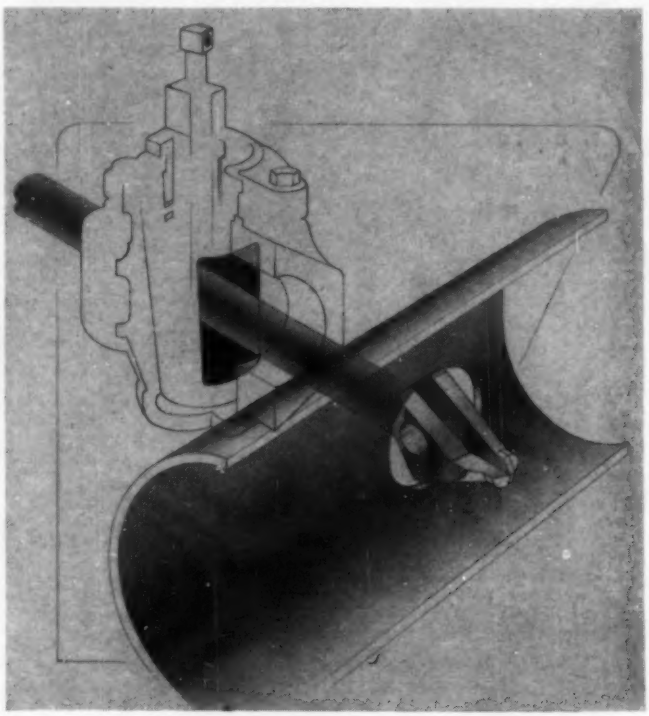


FIGURE 10

First of all there has to be the need for a hot tap connection. This need may arise out of the inability to shut down the operation of the existing system, or the realization that a shut down would entail a considerable expense to the operator. (One company estimates that every time they drain one tank and steam it out so that they can cut into it, it costs them an average of $5000.) It may be purely for convenience or safety sake that the decision to hot tap is made. Usually the economics of the situation prompt the tapping operation.

Types of branch connection fittings. After determining the size of the connection that is needed, a nipple split tee, or weld fitting of the proper diameter is welded onto the line or vessel. This type of fitting used is dependent on many factors: on pipe lines built prior to the use of modern high-tensile pipe where the welded point of attachment is not so critical, a plain scarfed nipple is generally used and is quite acceptable. It is desirable, however, especially if the connection will be subjected to considerable external stresses, to us a welding saddle for a mechanical reinforcement. (Figure 8.)

Reasonable caution should be taken to make certain that the nipple is welded on "true" or at right angles to the pipe or vessel. A proper lineup assures a smoother cutting operation, especially in sizes above 2 inches where shell cutters are used. Methods have been workd out for tapping into a vessel at up to a 45-degree angle, but this takes special cutters and other aids.

For the newer high tensile and prestressed pipe in use today it is generally agreed that a tapping connection should be of the type that completely encircles the pipe. It may be of the loosely-fitted tee, or of the tightly corseted tee (Figure 9) design, both of which have their distinct advantages. One may be accepted by one company and rejected by another, but both are more acceptable than the plain nipple or nipple and saddle.

Following the attachment of the nipple and flange, a valve is connected. For the normal tapping operation, any full opening valve of the desired size will be sufficient. For taps eight inches and below, a special flat spear-shaped drill has been developed for use with the rectangular opening plug valve. (Figure 10.) This makes it possible to get a tapped hole of 150 to 200 percent greater area than the valve opening. This cutter has found much favor, particularly in the natural gas industry. No coupon is recovered, of course, with a cutter of this design.

Regardless of the method used to set the valve, it must be determined first that the total length from the outside face of the valve to the pipe line does not exceed a certain critical distance; this distance being determined by the available boring bar travel of the tapping machine, the size of the tap to be made, and the diameter and wall thickness of the vessel to be tapped. These critical distances usually are contained in the instruction manuals published by the manufacturer.

Adapter fittings. Connecting the machine to the valve is accomplished by means of an adapter flange, reducer, or nipple. (Figure 11.) These adapters must be of the proper series and facing to match the valve and of the proper proportions so that when the machine is mounted on the valve, the valve may be closed without either the cutter shell or the pilot being in the way of the valve discs in its closed position. If these parts are not kept back out of the way, the whole purpose of the hot tap will be defeated, because after the completion of the tap it will be impossible to close the valve. Thus, the line will have to be drained or blown down in order to remove the tapping machine. A good check to make when making a tap is first to close and open the valve before the cutter is extended down to the pipe and begins its cutting.

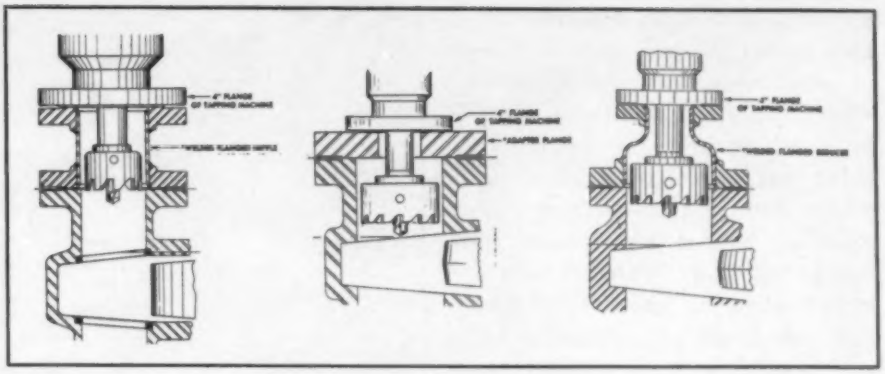


Fig. 11 (above)—Fittings for adapting tapping machine to various sizes of valves.

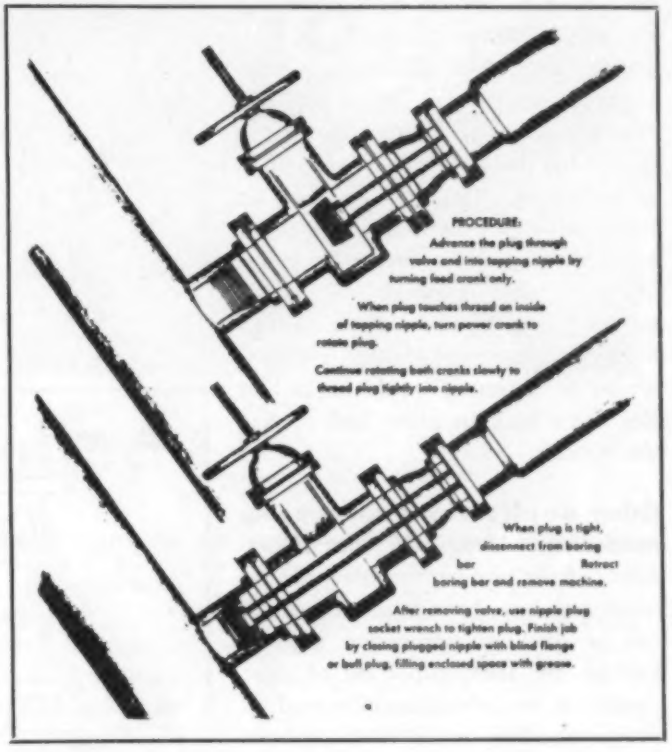

PROCEDURE:
Advance the plug through valve and into tapping nipple by turning feed crank only.
When plug touches thread on inside of tapping nipple, turn power crank to rotate plug.
Continue rotating both cranks slowly to thread plug tightly into nipple.
When plug is tight, disconnect from boring bar. Retract boring bar and remove machine.
After removing valve, use nipple plug socket wrench to tighten plug. Finish job by closing plugged nipple with blind flange or bull plug, filling enclosed space with grease.

Fig. 12 (right)—Welding an internally threaded nipple onto pipe line in place of plain nipple or tee connection.

After the machine is made up tight on the valve, the cutter is fed through it to the surface of the pipe line, the clutch engaged putting the machine into automatic feed as it rotates, and then the cutting operation is begun. The modern tapping machines usually are powered by either air or hydraulic power. Units also are available for tapping that can be done by hand.

The actual tapping of the vessel usually takes from 15 minutes to 1 hour and 15 minutes, this time being determined by the size of tap and the diameter and thickness of the pipe. Special cases or problems may take more than this, but by far the greatest amount of time required in any tapping operation is consumed by the welding of the connections and bolting and assembly and disassembly of the fittings.

Following completion of the tap, indicated by a measuring rod that advances as the cutter advances, the cutter and coupon are backed out, the valve closed and the machine and adapter removed from the valve. Piping can then be bolted to the valve at any time providing the new connection desired by the operator.

Fittings for temporary connections. The needs of a tapped connection are often only temporary such as in the case of drains in low spots for gas lines, air vents or test coupon installations in liquid lines, temporary crossover connections, auxiliary pump or compressor stations, water intake and discharge connections for pressure testing new or old lines, and a host of other applications. For such connections it is often desirable from either the economic or safety standpoint to recover the tapping valve. The procedure for making temporary connections is basically the same as for permanent ones with the exception of the fitting to which the tapping valve is mounted on the pipe line. These fittings make it possible to recover any full-opening tapping valve from 2-inch through 24-inch. This may be accomplished in two ways.

One method which has been in use for some years is to weld an internally threaded nipple onto the pipe line in place of the plain nipple or tee connection. (Figure 12.) After the desired use is made of the tapped connection, a plug with matching threads may then be installed on the tapping machine in place of the cutter or drill, extended through the tapping valve and screwed in place. The valve may then be removed and a blind flange or bull plug attached in its place. This design has certain limitations in that the thicker nipple necessary for accommodating the internal threads reduces the maximum size of hole that can be tapped through any certain sized fitting, and that the welding of slip-on flanges and saddles often causes warping of the threads to a point where it is difficult to make up the threads in the larger sized fittings. Therefore, an eight-inch fitting is about as large a connection as can be used effectively.

A more recent development is shown in Figure 13. This consists of a weld neck flange into which four

segments of a split steel ring have been placed and positioned by means of attached set screws. The plug, which is inserted as in the first method by attaching it to the tapping machine, has a companion groove into which these segments are extended when the plug is in its proper position in the flange. This mechanically locks the plug in place. "O"-rings on each side of the plug groove provide a pressure tight seal. A blind flange may then be bolted on in place of the valve. This method of recovering the tapping valve offers the advantage of maximum diameter hole through any size fitting, allows the use of any desired type of fitting such as nipple or split tee, and puts no limitation on the size tap which can be made and still recover the valve. On both these methods, of course, should it ever be desirable to use this tapped connection again, all that would be necessary would be to bolt the valve back in place and reverse the process.

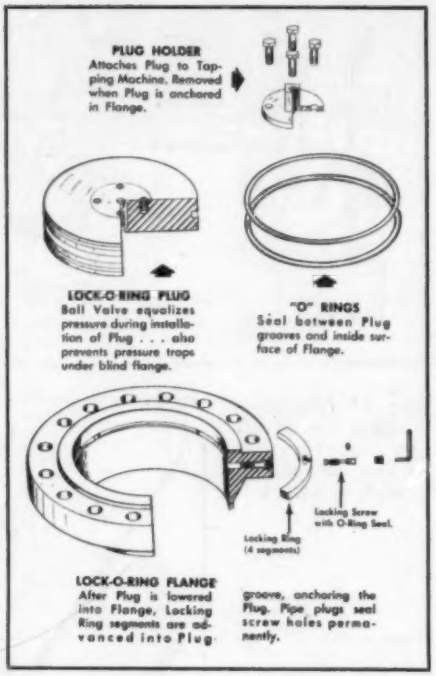

PLUG HOLDER
Attaches Plug to Tapping Machine. Removed when Plug is anchored in Flange.
LOCK-O-RING PLUG
Ball Valve equalizes pressure during installation of Plug . . . also prevents pressure traps under blind flange.
"O" RINGS
Seal between Plug grooves and inside surface of Flange.
Locking Screw with O-Ring Seal.
Locking Ring (4 segments)
LOCK-O-RING FLANGE
After Plug is lowered into Flange, Locking Ring segments are advanced into Plug groove, anchoring the Plug. Pipe plugs seal screw holes permanently.

Fig. 13—Special flange and plug used for recovering tapping valve.

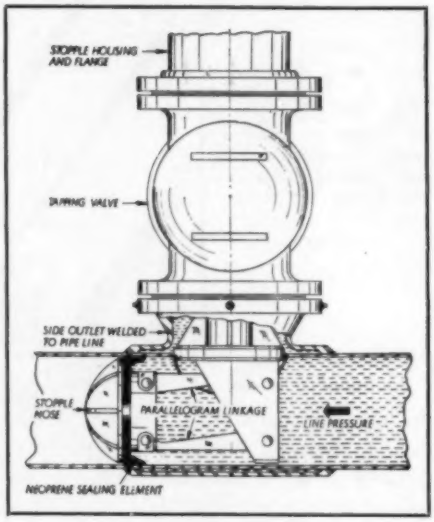


FIGURE 14

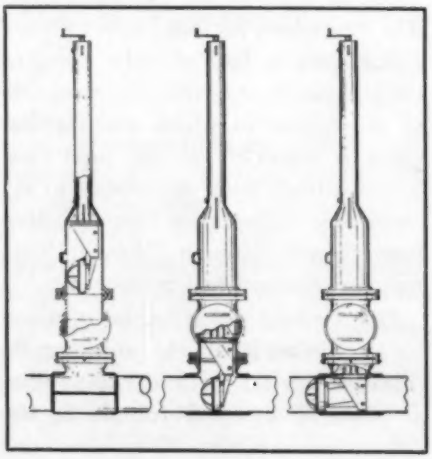


FIGURE 15

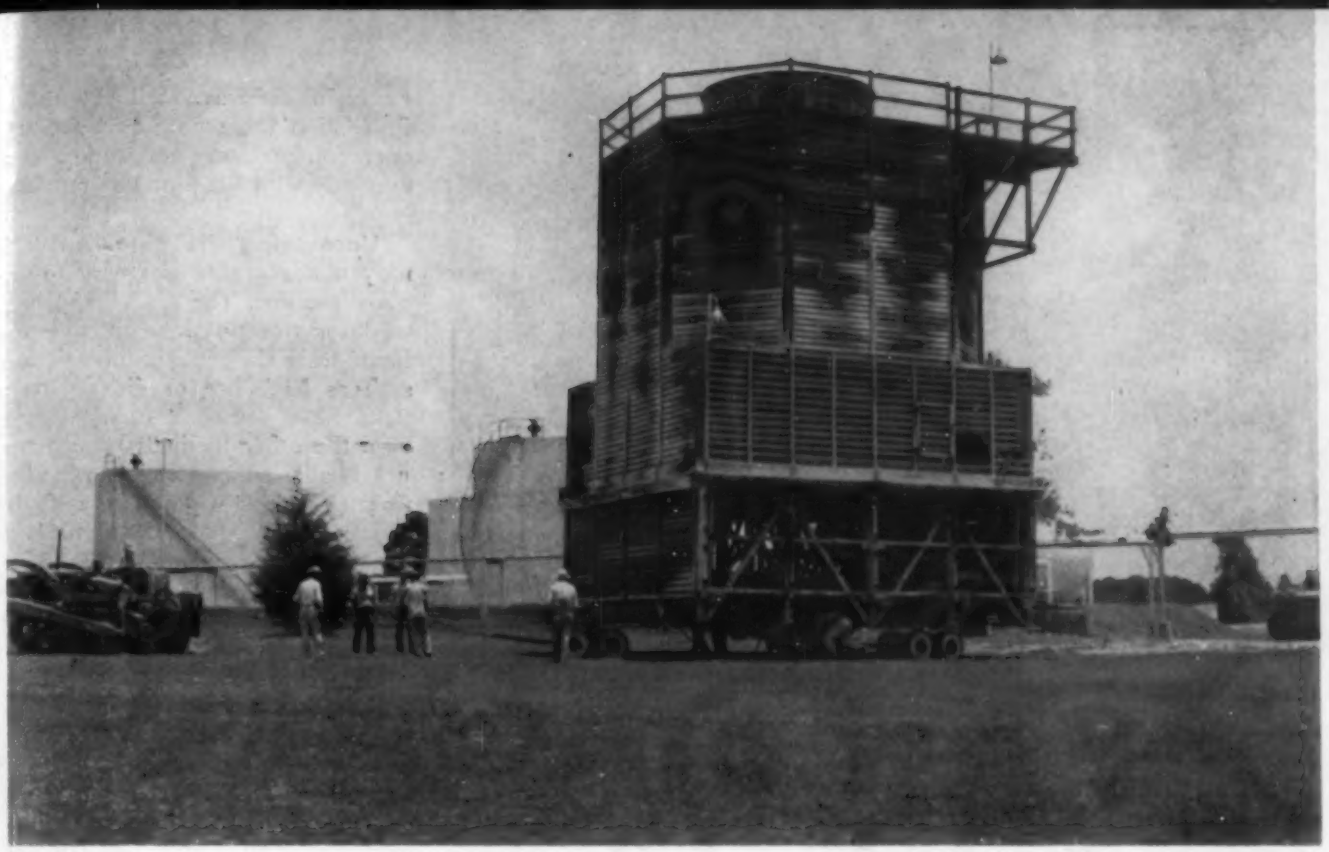
Other applications for tapping machines. Along with the refinements of the tapping machine, several other tools have been developed which can be used in conjunction with it. Perhaps the most important of these devices is one which can be used to plug a pipe line, so that valves, booster stations, sections of pipe, scraper traps, insulated flanges, metering devices, loops, valves and other fittings can all be installed without draining down the pipe line and often without interrupting operations. To accommodate this plugging machine it is first necessary to make a tap which is only slightly smaller than the inside diameter of the line to be plugged. This requires a shell cutter slightly greater in outside diameter than standard cutters and somewhat greater in depth to make the deeper cut. After the tapped-out section of pipe has been withdrawn, the tapping machine is removed and the plugging machine bolted in its place.

This plugging machine consists of a sealing element of two hardnesses of synthetic rubber (Figure 14) attached by a parallelogram linkage to a large steel shaft and housed in a high pressure steel body. In the manner of a screw jack, the sealing element is cranked into the pipe line through the tapped hole and positions itself as shown in Figure 15. In this position, an immediate seal is realized, and the pipe downstream from the pressure side may be worked on as the operator wishes. Depending upon the location and type of work to be done, either one or two of these units can be used to accomplish the desired results. One company recently used two of these 20-inch plugs to tie in several valves and booster stations. They isolated the sections to be worked on and kept pumping through a bypass laid around this section, this also being made possible by hot tapped connections to their main line. By eliminating their downtime, a savings of many thousands of dollars was realized.

Fittings such as orifice plates, thermometers, strainers, tank mixers, fire control and measuring devices, corrosion test coupons, sample tubes, siphons, and many other devices may now be or soon will be installed with the use of tapping machines without any shutdown, drainage, or interruption to service. The actual limits to its application are as broad as the imagination of its present or potential users.

Tapping machines were used at first primarily in low-pressure water and gas distribution systems, then more and more frequently on high-pressure transmission lines.

Summary. With the increasing variety of problems that can now be solved with tapping machines and their accessory tools, pipe line companies, as well as many other industries, are discovering that hundreds of thousands of dollars annually may be saved by taking full advantage of this equipment. Routine and special jobs heretofore impossible to do without a major shutdown of their facilities can be accomplished with relative ease and safety, without any interruption of service, and at a minimum of expense or investment. —**The End**



Cooling Tower Moved Intact

United Gas uses house-moving technique to move tower to new location.

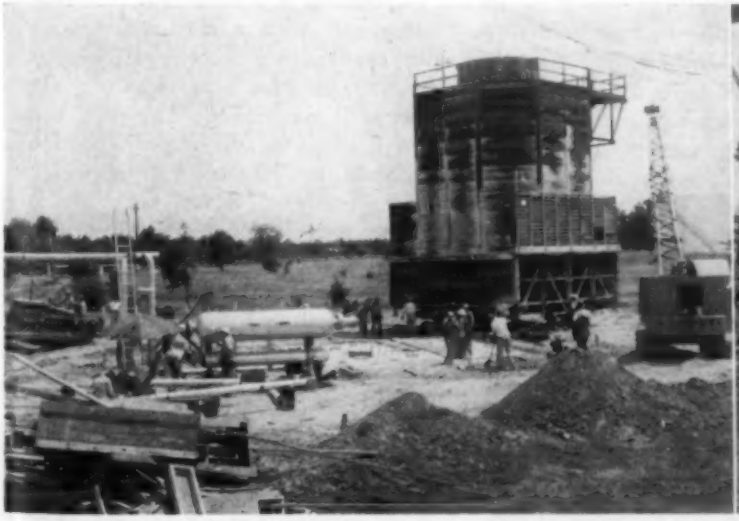
WHEN THE United Gas Pipe Line compressor station at Carthage, Texas, was enlarged recently, it outgrew the existing cooling tower. But instead of tearing the structure down and rebuilding it at another location, company engineers simply put the 24 by 24 by 36-foot-high induced-draft tower on what was in effect a giant tricycle and carted it across country to a new location on the plant site.

Three sets of dollies, clamped to long 12-inch by 12-inch running sills in the form of an "A" frame, were used to move the tower; one set under the juncture of the sills; the others used one under each of the legs.

The movers were able to follow a gravel road much of the way, but when uneven ground or ditches did have to be crossed, wooden planking was used to keep the tower as level as possible.

At a new location, base of the concrete basin and the concrete supports for the tower were prepared in advance. Provision was made to construct the walls of the basin after the tower was in place.

From United Gas Log, December, 1954.



MOVING THE TOWER around a curve to bring it alongside its new foundation.

LOWERING the transported tower nto previously prepared new foundation.

LINE WAS UNCOVERED by a diesel motor grader. The amount of ditch completed per day was equal to other methods used on other reconditioning programs and the resulting V ditch was more accessible to both men and equipment.

Motor Grader Speeds Up A Reconditioning Job

This versatile machine was used by Utah Oil Refining Company for both ditching and backfilling.

By DALE W. MOSIER, Utah Oil Refining Company, Rawlins, Wyo.

MODERN PIPE LINES, with their improved coatings and cathodic protection devices, have almost reduced corrosion maintenance to patrolling the line and looking after the protective devices. However, the useful life of older lines such as the Utah Oil Refining Company's eight-inch between Medicine Bow and Ft. Laramie, Wyoming, can be economically prolonged by a well integrated reconditioning system.

Reduced to its essentials, reconditioning is simply the repair of the pipe by welding the corrosion pits and the application of new coating. This is often done—as in this instance—by small, full-time maintenance crews, that recondition enough line each year to keep the breaks and leaks at a low frequency. The amount of reconditioning is varied from year to year as the crew's schedule and the leak frequency dictate.

This particular line which is located at elevations from 5000-7000 feet in the semi-arid country of southeastern Wyoming, is uncoated. It crosses the Laramie Mountain Range in a remote area west of the town of Wheatland. This makes it difficult to repair in winter.

Last summer's schedule called for reconditioning a total of three miles in three locations. These locations were, of course, dictated by the leak reports, and the amount of reconditioning determined by soil tests, chiefly soil resistivity tests. Additional protection was provided by the use of magnesium anodes. The location and number of these anodes varied according to the soil resistance measurements and the results of our experience in this area. This anode installation was set up as a separate operation and was not worked concurrently with the pipe line repair.

Uncovering the pipe. An ordinary motor grader was used to uncover the line. The grader had been used for this purpose before and found to be the equal of other means, such as back hoe or ditcher, on a footage per day basis. Its advantages over the other methods were many. (1) It allowed easy access to the line from either side without the necessity of raising the pipe and pulling it to one side. (2) It provided a wide, clean, smooth work area, of which the ditch itself was a part. (3) The fact that we could use the ditch as a work area materially reduced the right-of-way width. (4) The pipe could be cradled out of the ground ahead of the cleaning machine and the skids placed after the pipe was cleaned. This effected a substantial reduction in labor cost. (5) The ease of access to the pipe was an important safety factor. No reportable injuries were incurred in the entire project.

The ditch was opened in the form of a wide "V," the sides sloping downward about 22 degrees to the side of the pipe. This made the "V" about ten feet wide at the top. The spoil was then spread with the patrol blade an additional fifteen feet on each side, making an over-all right-of-way width of 40 feet. In backfilling, this spoil was bladed into the ditch with the patrol, making a wide rounded windrow and a smooth, neat right-of-way.

Cradling and cleaning. The pipe was raised with a sideboom tractor and cradle, and a traveling-type cleaning machine was run over the pipe as it was raised. The pipe was then lowered on skids for inspection and welding. Where severe corrosion was encountered, it was necessary to reverse the cleaning machine and cover the area several times until all scale was removed. In less severe areas, the three operations—raising, cleaning, and skidding—were simultaneous and involved only three men.

Coating. After the pipe was inspected and welded, it was coated by hand. Machine wrapping, while fast, usually requires a more elaborate outlay of men and material than the

normal maintenance crew can field. Hand coating need be neither slow nor dangerous.

A good crew of six men can average sixteen to seventeen hundred feet per eight hours. The pipe was coated with an asphalt enamel, fiber glass, and asbestos felt. An asphalt primer was first applied to bond the enamel and pipe, and one coat of enamel was applied. After this had cooled, the fiber glass was carefully and smoothly wrapped over it. This cold application of fiber glass speeds up the coating process. When carefully performed, no difference in its reinforcing characteristics can be detected. A second coat of enamel was then applied, and while it was still hot the asbestos felt was wrapped over it. This second coat of enamel penetrates the fiber glass and bonds to the first coat and to the asbestos felt, making a hard, tight coating reinforced by the fiber glass. With the exception of the fiber glass this is, of course, an old process —but a very practical one on small scope projects.

Safety equipment. In addition to the usual safety equipment, light weight, wide vision plastic goggles were provided, the wide vision feature being particularly beneficial. Long wristlet gloves and auxiliary sleeves or gauntlets were used during coating operations. **As previously stated, no injuries of even a minor nature were incurred.**

Job ran ahead of schedule. By July 15 the work was ahead of schedule, and another 1¼ miles was added to the program. On August 1 another three-fourths mile was added, making a total of five miles of line reconditioned. The total manpower available, including the foreman, averaged less than eight men per day.

Due to the remoteness of the area, average travel time was 1½ hours per man per day. This increased the cost, but was more than offset by the efficient use of good equipment and improved work methods—the main features being the method of ditching; the combining of three operations—raising, cleaning, and skidding —into one operation; and the method of applying the coating.

LINE WAS RAISED by cradling and the traveling cleaning machine followed immediately behind cradle.

MEASURING OUTPUT of magnesium anode are Author Dale W. Mosier, connection foreman (left), and Albert G. Davis. Arid nature of this section of Wyoming made it necessary to bury anode deep to insure proper moisture to activate anode.

BACKFILLING with motor grader was fast. Work conditions were ideal at this point.

Photographs by Howard E. Keith, Utah Refining Company.

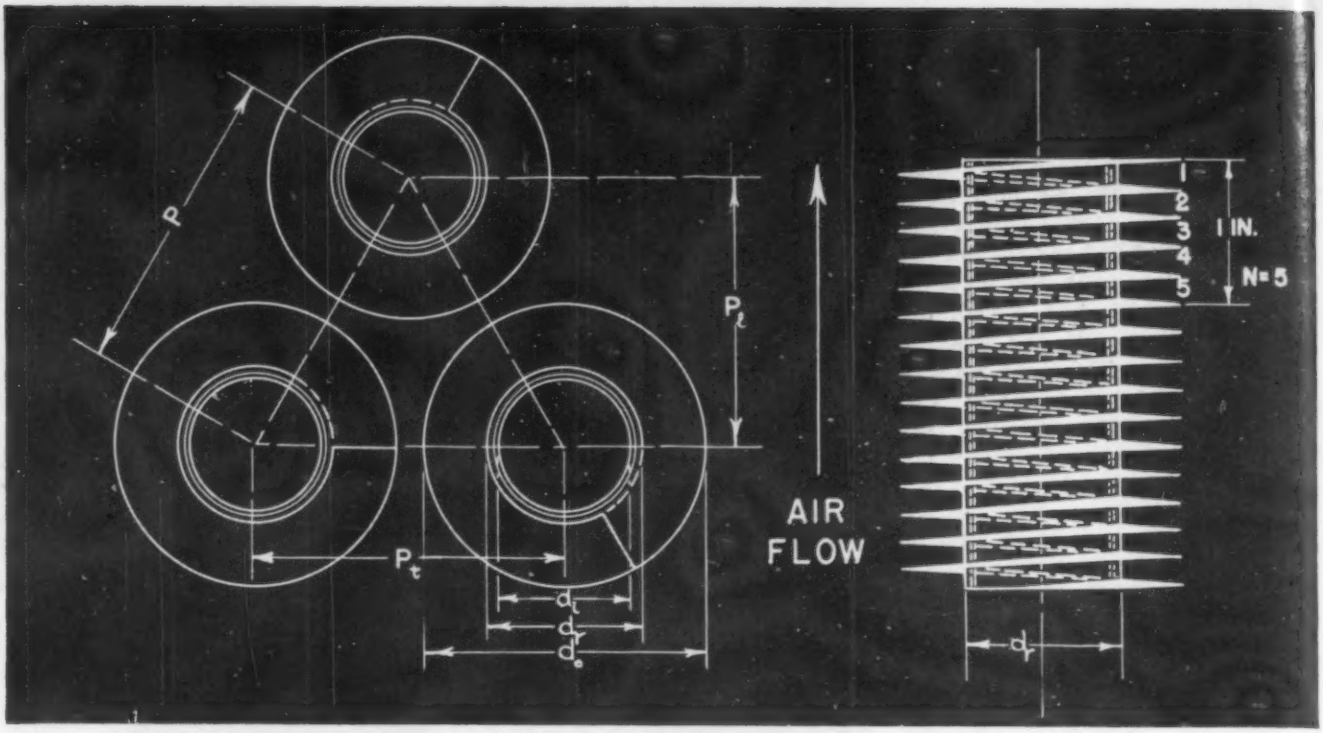


Fig. 1—Nomenclature for dimensions of finned tube and tube spacing.

How to Design Atmospheric Coolers

Correlations based on test data from 30 units show that heat transfer and pressure drops can be predicted for liquids that are cooled by finned coils.

By DONALD L. KATZ, EDWIN H. YOUNG, RICHARD B. WILLIAMS and GAREN BALEKJIAN,
University of Michigan, Ann Arbor

ATMOSPHERIC COOLERS are becoming more and more popular for cooling liquids, especially where water supply for cooling towers is a problem. Heat transfer and pressure drop data for gases passing over banks of plain tubes have been correlated[1, 2] based on the tube diameter, transverse spacing and longitudinal spacing of the tubes.

Correlation of similar data for finned tubes involves added variables over those for plain tubes, including fin height, fin spacing, and ratio of fin diameter to root diameter. Data and correlations for air passing across banks of finned tubes have been reported, but no general correlation of this information was available at the time this work was started.[2, 3, 4, 5, 6] Schmidt[7] treated the problem of heat transfer and pressure drop during the course of this study.

The data in the literature as well as test data reported from a group of private laboratories were assembled and analyzed. Experimental data on thirty units containing transverse finned tubes with various pitches, tube arrangements, fin heights, fin spacings and tube diameter were available.* The face area of the units varied from 11.6 by 7.5 inches to 24 by 20 feet. There were two types of tubes used, integral fin construction made from copper or aluminum and bi-metal fin construction with aluminum fins and root metal over copper liners. In all cases, heat transfer data were obtained for a series of air velocities passing over the coils with the air being heated.

Two correlations of the data have been made. The first is for air passing across banks of tubes at a specific velocity in feet per minute. In this case it is not necessary to use the properties of air, although it must be recognized that air normally entered the coil at room temperature and was heated up to a temperature not exceeding some 250 F.

Figure 1 shows the nomenclature for describing finned tubes.

Correlations for Air—The data were all reduced to a basis of film coefficients of heat transfer per square foot of outside surface. In many cases fluid was circulated inside the tubes at a series of velocities which could be

* Dimensions of the units tested and example calculations are given in a report "Correlations of Heat Transfer and Pressure Drop for Air Flowing Across Banks of Finned Tubes," Engineering research Institute, University of Michigan, by the same authors.

extrapolated to infinite velocity thereby obtaining the resistance of the metal wall and the outside film. In the cases where steam was condensing inside the tubes it was necessary to assume a condensation coefficient for steam to compute the outside coefficient. The range of outside coefficients in Btu's per (hour) (°F) (square feet outside surface) was 2.8 to 39.6.

Figure 2 shows the heat transfer coefficients for the outside surface as a function of the maximum air velocity in feet per minute. The maximum air velocity is computed from an air density of 0.074 pounds per cubic foot and the minimum cross-sectional free flow area between the tubes. It may be seen from Figure 2 that at a given velocity heat transfer coefficients vary 3 to 1 for the best tubes and their arrangement as compared to the poorest tubes and their arrangement. It might be noted that units 11, 12, and 13 had an in-line arrangement for the tubes. Units 1 and 22 had a single row of tubes while the other units were

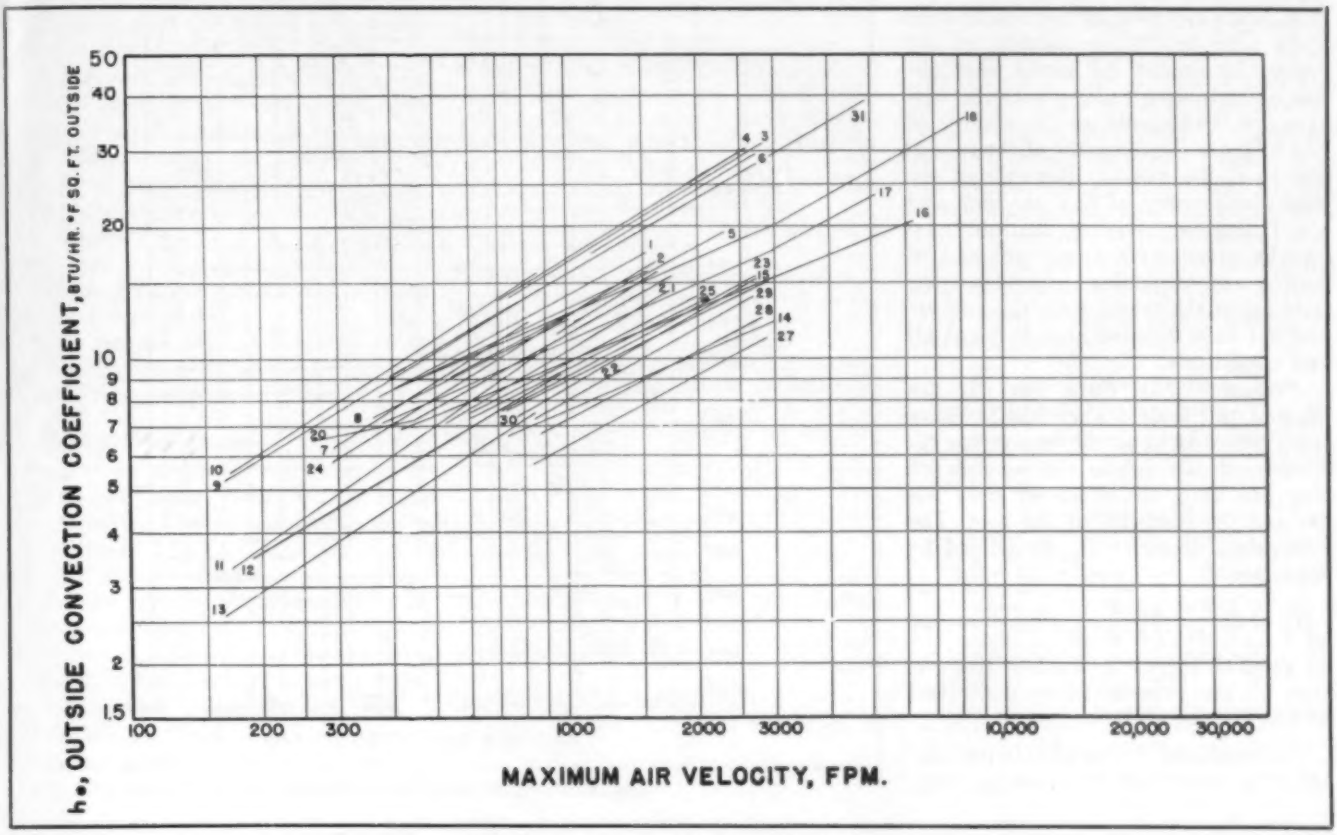


Fig. 2—Summary of heat transfer data.

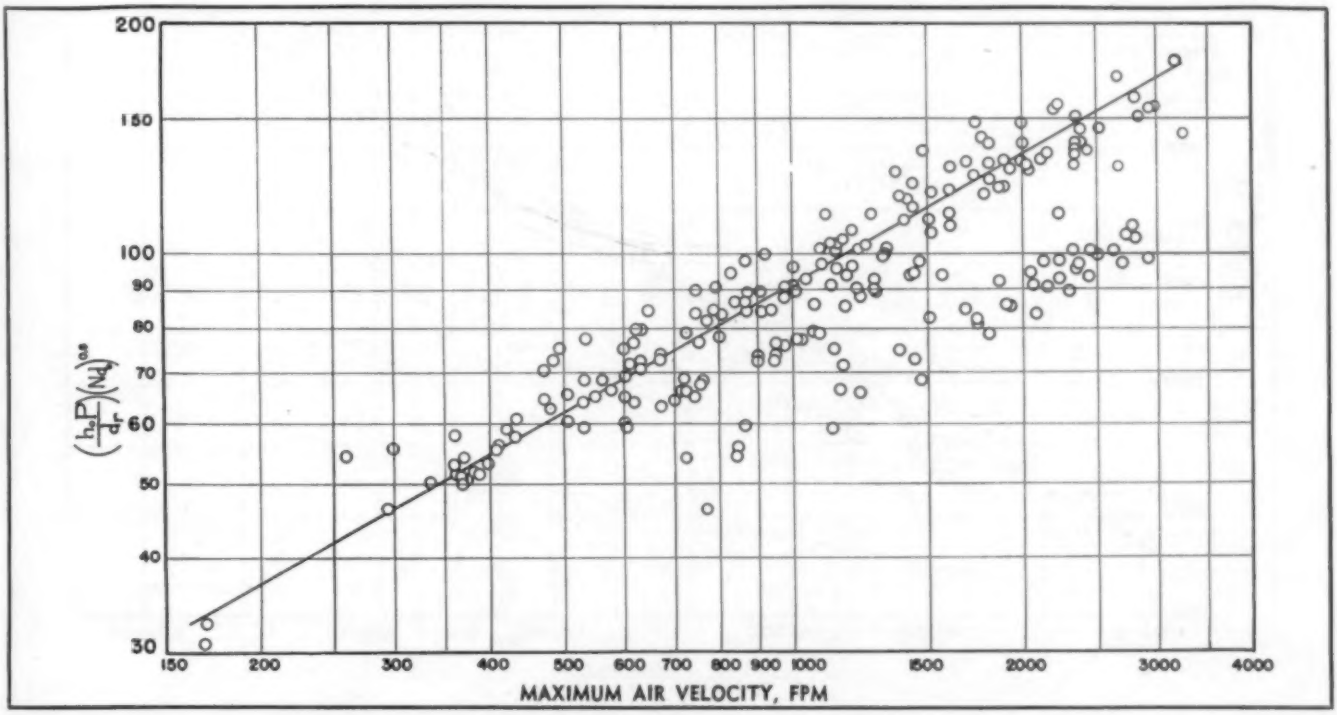


Fig. 3—Heat transfer correlation for air.

all triangular spacings with two to eight rows of tubes each. In all cases the average transfer coefficient of all rows was used. No distinction could be made between the heat transfer performances for single rows or multiple rows of tubes.

Figure 3 shows the heat transfer coefficients along with physical dimensions of the system plotted against the maximum air velocity for finned tube coils with triangular spacing of the tubes. It should be noted that the variables included along with the heat transfer coefficients on the outside of the tube are the diameter of the tube at the root, the overall diameter of the fins, the number of fins per inch and the triangular spacing. Reasons cannot be given why some groups of points are considerably below the average of the others since the authors did not have detailed knowledge of all test conditions.

Pressure drop data for air are plotted on Figure 4 where the pressure drop depends upon the equivalent diameter of the tubes, the number of fins per inch, the diameter over the fin and the diameter of the root. The equivalent diameter D_{eb} is defined by Equation 1.

$$D_{eb} = \left(\frac{N\, d_o}{12}\right)\left(\frac{P}{d_r}\right)^2 \qquad (1)$$

In general, there was a better correlation of the pressure drop data than of the heat transfer.

Generalized Correlations—By utilizing those tests in which the tem-

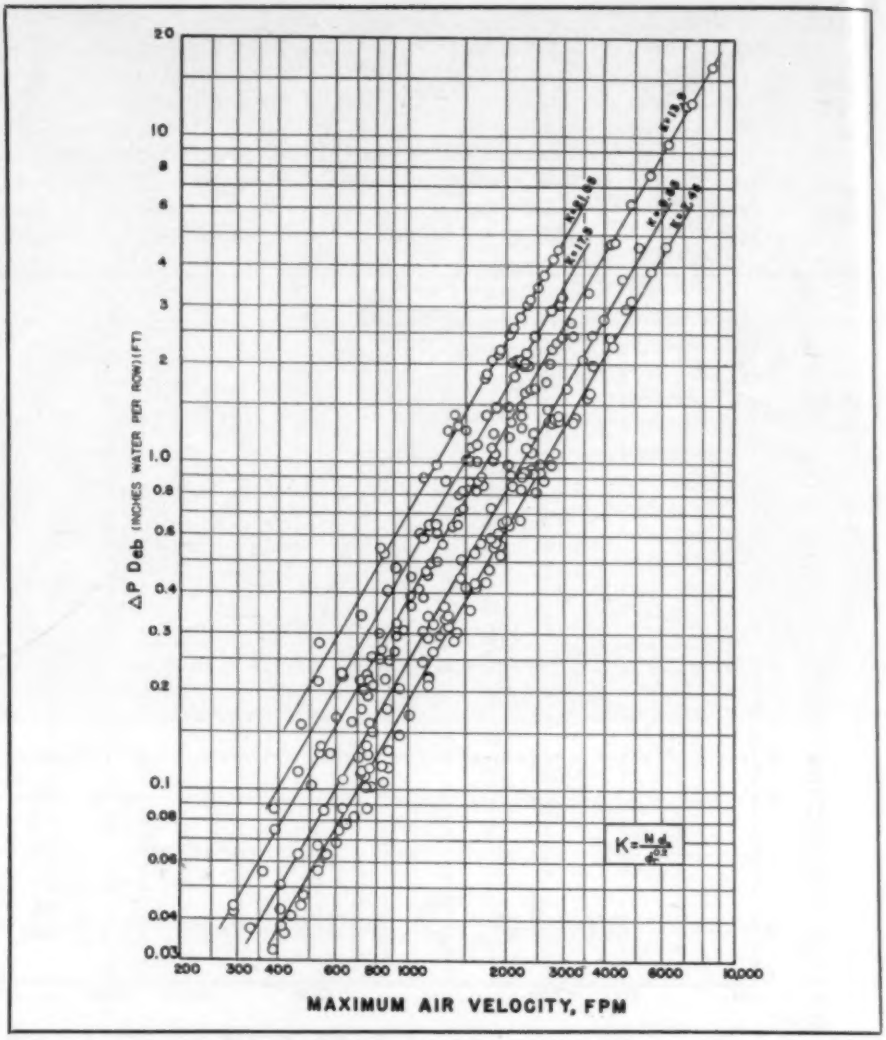


Fig. 4—Pressure drop correlation for air.

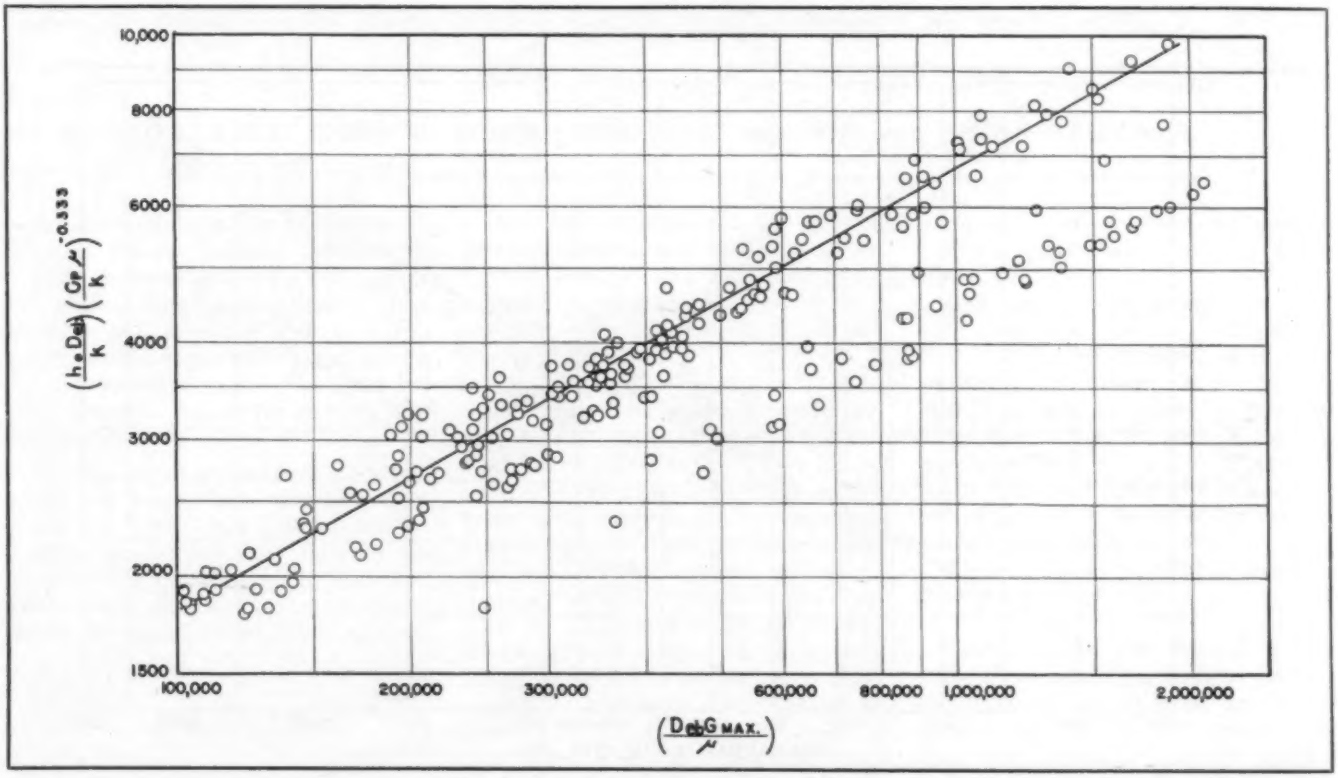


Fig. 5—Generalized heat-transfer correlation.

perature of the air was known at the mean condition, it was possible to devise a generalized chart in terms of the Nusselt number, the Prandtl number and the Reynolds number as shown on Figure 5. Not all of the tests provided the temperature of the air and therefore could not be included. Figure 5 may be used for predicting the heat transfer coefficient for any fluid passing across banks of finned tubes when the properties of that fluid are known.

A generalized pressure drop correlation is given in Figure 6 employing the equivalent diameter and the maximum fluid velocity, the number of fins per inch, the diameter over the fins and the diameter at the root. The dotted lines on Figure 6 at the low Reynolds numbers may be indicative of the transition from turbulent to laminar flow conditions.

The correlations of Schmidt[7] were tried but found to be no better than those presented here.

Bond Resistance—Those tubes which are bi-metal were treated in exactly the same manner as integral finned tubes. The resistance due to the bond for bi-metal tubes is believed to be less than 10 percent of the over-all resistance for the usual monometallic tube when used with gases flowing on the outside. If such a resistance is present in the data for bi-metal tubes, it is included in this correlation. Although more bond resistance may have been present in those tubes which gave the lowest heat transfer coefficients on Figure 2, the range in coefficients for monometallic integral finned tubes covered the upper three-quarters of the heat transfer coefficients. On Figure 3, the data which cluster around the correlating line include test data from eight all copper units and nine aluminum-copper bimetallic units.

Effect of Tube Spacing—In assembling finned tube banks, the clearance between the tubes has considerable effect on heat transfer coefficients and pressure drop as noted by the correlations. The best heat transfer is obtained for a given number of tubes when the tubes are arranged with fins tip to tip. A reduction in heat transfer and pressure drop occurs when the space between the tips of the fins is increased. Air passing through this space would come in contact only with every other row. The correlations may be used to find the economics of the situation by computing pressure drop and heat transfer performance for various spacings.

NOMENCLATURE

C_p	Specific heat of fluid at average temperature, Btu/(lb)(°F)
D_{eb}	Equivalent diameter for tube bank, ft.
d_i	Inside tube diameter, inches
d_o	Diameter over the fins, inches
d_r	Finned tube root diameter, inches
G_{max}	Maximum mass velocity in cross flow outside tube banks, lb/(hr)(ft²)
h_o	Outside film coefficient, Btu/(hr)(°F)(ft² outside area)
K	Parameter for cross flow pressure drop
k	Thermal conductivity of fluid at average temperature, (Btu)(ft)/(hr)(°F)(ft²)
N	Number of fins per inch
P	Triangular tube spacing, inches
P_l	Longitudinal pitch, distance between two tubes in a row parallel to flow direction, inches
P_t	Transverse pitch, distance between two tubes in a row normal to flow direction, inches
ΔP	Pressure drop for crossflow of fluids in tube banks, inches water per row of tubes normal to flow direction
V_{max}	Maximum fluid velocity through minimum free-flow face area, ft/min.
Re	Reynolds number
ρ	Density of fluid at average temperature, lb/ft³
μ	Viscosity of fluid at average temperature, lb/(ft)(hr)

ACKNOWLEDGMENT

Permission to publish this paper by Wolverine Tube Division of Calumet and Hecla Incorporated is appreciated. The courtesy of a group of industrial laboratories in permitting their data to be used in the correlation is acknowledged.

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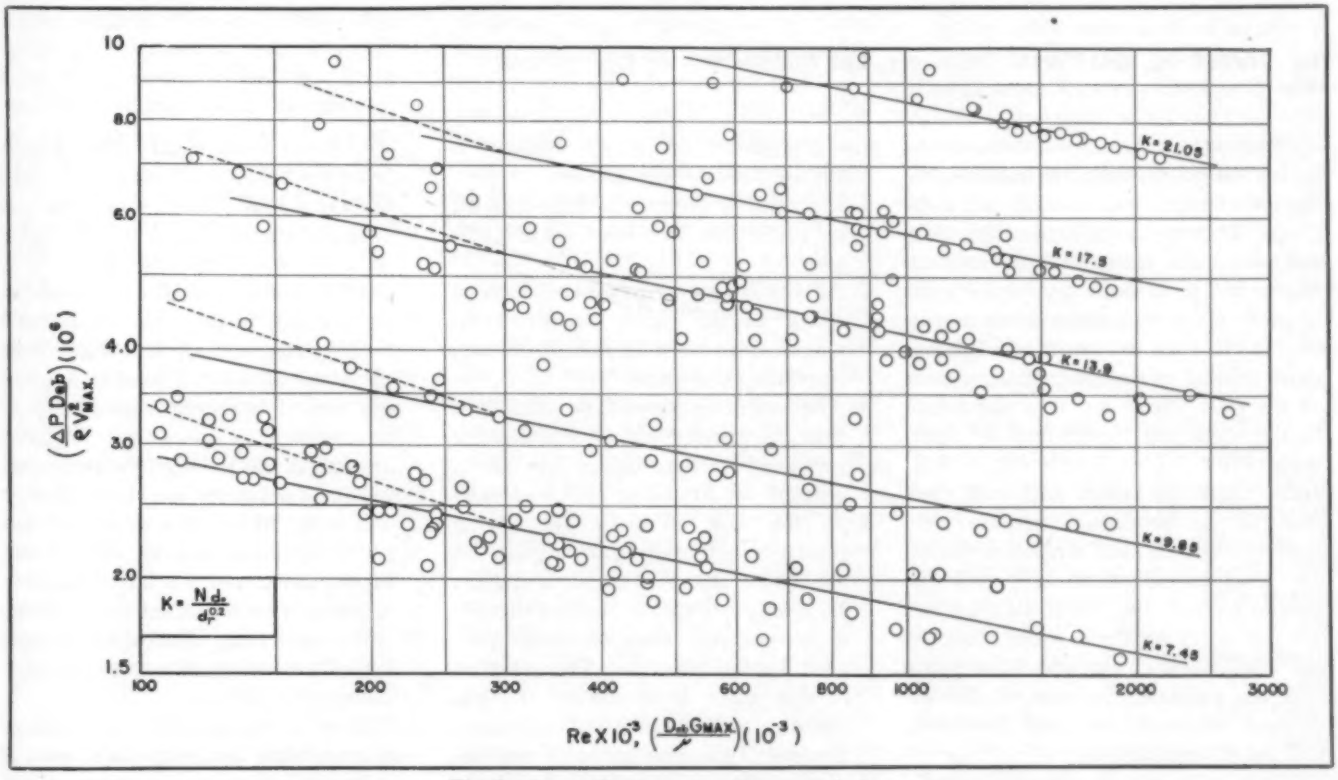


Fig. 6—Generalized pressure drop correlation.

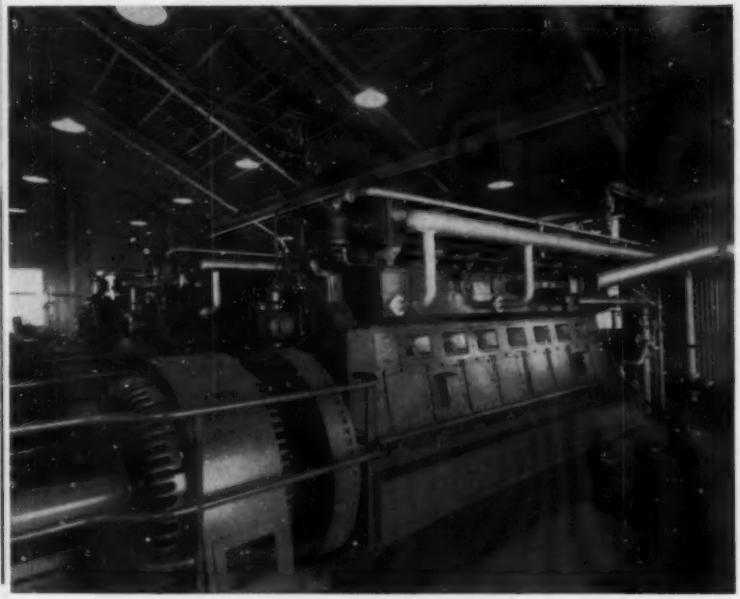


Fig. 1—Standard naturally aspirated four cycle gas engine with gas mixing valve.

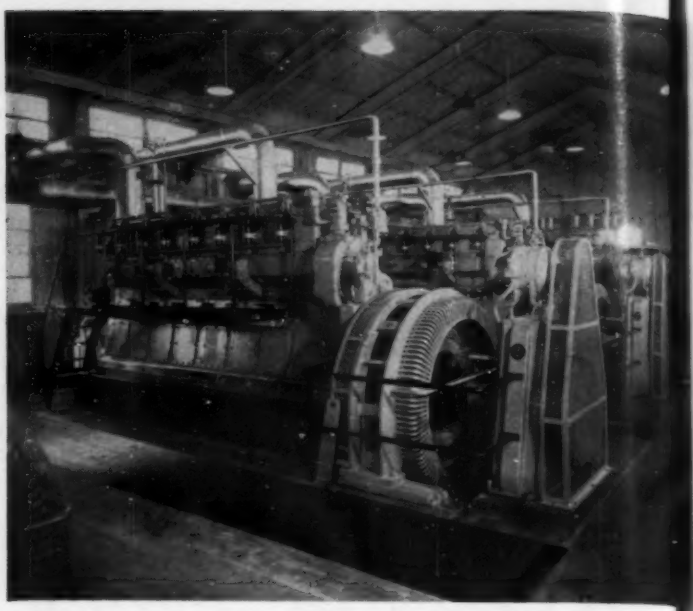


Fig. 2—High compression four cycle naturally aspirated gas engine.

When and how to achieve . . .

True Engine Cylinder Balance

Your gas engines must be 'in balance' if they are to perform at maximum efficiency.

By JAMES H. CALDWELL, Manager, Los Angeles Service Department,
The Cooper-Bessemer Corporation

SOON AFTER the introduction of the higher output engines, it became evident that more importance had to be placed on engine balance. This does not necessarily mean that the modern engine has to be balanced periodically or more often than the old low output engine. In fact this modern engine is more critical to tinkering than engines of the past. However, it is important to use signs and indicators to determine when an engine is out of balance. Once the signs and indicators point to that condition, then and only then the engine will require a tuning up. It is important to keep any engine in balance because if all cylinders are not carrying their equal share of the load, detonation will take place and the engine, because of the increased temperatures and pressures, will go to destruction.

There are certain essential conditions required before an attempt is made to balance any engine.

1. It should be done with three-quarter or preferably full load on the engine.
2. All the ignition equipment, such as spark plugs, coils, condensers, points, etc., must be in satisfactory operating condition.
3. The operator should be confident that the scavenging air is not being restricted by carbon in the ports, clogged air filters, or faulty vales.
4. In the case of multiple engine plants a separate gas regulator should be installed on each engine. In a majority of gas engines there is a gas control valve which is operated by the governor. The purpose of this valve is to control the gas pressure to the individual cylinders, thereby regulating speed of the engine with change in load. It is very important to have this valve almost wide open when the engine is pulling rated load. There should be just enough reserve travel in this valve to carry an acceptable amount of overload which in all cases is about 10 percent. If this valve is allowed to be positioned at only half of its travel while on full load it is obvious that a higher gas pressure will be needed to force the required amount of gas through the restricted valve. Therefore, any load change will make this valve move an appreciable amount and due to the higher gas pressure a large quantity of gas will be admitted through the valve enriching the mixture and actually causing detonation and a hunting condition.
5. Due to variations in such castings as manifolds, headers, valves, etc., it is impossible to get all engines in a

plant, even though they are the same model, to perform identically with the same amount of gas pressure. It therefore is essential to have an individual regulator for each engine as mentioned above. With this individual regulator it is then possible to vary the gas pressure of each engine until the governor opens the regulating valve to almost a full position when carrying full load.

The problem of balancing an engine brings up the subject of the exhaust pyrometer. It is a very valuable instrument and as a rule should be used in every installation. It is essential for detecting faulty plugs, coils, condensers, points, exhaust valves and to a certain extent will give some indication of load. However, pyrometers should not be used in balancing engines.

The first is the standard naturally aspirated four-cycle engine, in which a mixing valve is usually employed to get the proper air to fuel ratio to all cylinders. As the balance of the individual cylinders has been taken care of by the design of the manifold and one mixing valve, the operator does not have to make adjustments for each cylinder to carry its equal share of the load. The air to fuel ratio at the mixing valve is the only adjustment necessary. Although this engine is of the low-compression type it is not as critical to balance as the other types of gas engines. It is merely essential that all parts of the ignition system and valves as well as the mixing valve be in gocd condition. Figure I is a typical example of this type of engine.

The next method of engine balance covers two different types of natural gas engines. First, the high-compression four-cycle naturally-aspirated natural gas engine on which there are several different adjustments necessary to realize good balance between the cylinders. This engine has a butterfly valve in the air intake manifold which varies the pressure in that manifold with load. There is also an actuator which varies the ignition timing with load. Furthermore, there are individual valves in the gas entrance pipe at each cylinder by which the amount of gas to each cylinder can be adjusted. Figure 2 is a typical example of this engine.

The second type of natural gas engine that can be included in the explanation of engine balance is the high compression four cycle supercharged spark ignited engine. This engine is similar to the one above, except that it employs an exhaust-driven supercharger which supplies additional air for supercharging effect, as well as increased scavenging of the clearance volume between the piston and cylinder head. Like the engine explained above it has an air butterfly valve in the discharge of the supercharger which can be used to control air manifold pressure.

It also has an actuator for varying the ignition timing with load, and there is a gas valve at each individual cylinder head for adjustment of the amount of gas to each cylinder. These latter two types of natural gas engines present more of a problem in balancing the load between cylinders. Perhaps this is true, because there are several variables involved. That is, the air manifold pressure and the ignition timing vary with the load and can be adjusted, and the quantity of gas injected to each cylinder also can be adjusted.

Look and learn. When the factory service engineer installs and adjusts these engines, operators in the plant should watch carefully and thoroughly understand all adjustments before he leaves. In addition, at that time the air manifold pressures and ignition timing for one-half, three-quarters and full load should be recorded. The gas pressure and air pressure to the various controls likewise should be recorded. With this information and everything in adjustment, the engine should be left alone. Tinkering to get the *n*th degree in economy even when done by experts definitely leads to trouble. The engine should be left alone until signs and indicators tell when adjustments are necessary.

One nice feature of these engines is that they will soon tell the operator when adjustments are required. An unbalanced engine of this type will detonate, particularly when pulling heavy loads. The operator need not have a stethoscope to detect this detonation. The basic theory of these engines can be used to explain why under certain conditions they will detonate. The cylinders are charged with a gas to air ratio which is on the lean side of a perfect mixture. This mixture is such that if it is compressed, it will not detonate with the proper ignition timing. With such a mixture the ignition can be accurately timed and combustion will be controlled.

Therefore, the only thing that can upset the original balance is malfunctioning of the controls which changes the air to fuel ratio. This could be wear in a linkage or cams operating a butterfly and gas valves, or wear in the linkages which vary the ignition timing with load. If detonation starts, the manifold and timing settings for one-half, three-quarter and full load should be compared with the original settings. Gas header pressure and air pressure that actuates the controls should also be compared with the original figures.

A hot dry season can also upset the air to fuel ratio and cause sharp detonation particularly when the engine is heavily loaded. However, those conditions are usually anticipated by the engine builder and a means of cooling the air to the engine is provided. If detonation at high ambient temperatures cannot be eliminated by increasing the air manifold pressure then the engine builder should be consulted.

If for some reason the operator is confronted with the problem of installing new controls, or if wear has caused unbalance, he should make adjustments to give the original settings of air manifold pressure, ignition timing, gas pressure and air pressure to the controls. Before attempting to make any adjustments, make sure that "the necessary conditions before adjustments should be made" mentioned in the beginning of this article are checked.

Job at a time. When balancing an engine, tackle one adjustment at a time, if after these adjustments have been made, one or more cylinders are detonating sharply, then the gas to those cylinders can be reduced to relieve the detonation. If all cylinders tend to detonate, the cam which operates the air butterfly valve can be shifted to give more air. Once the sharp detonations have been relieved and the engine seems to be carrying the load nicely, the operator can make

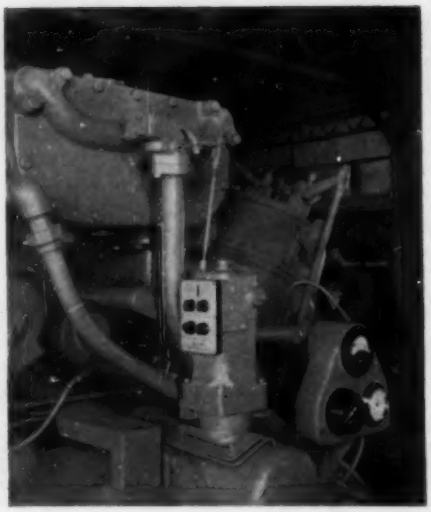


Fig. 3—Gas regulating valve and governor linkage on a two cycle gas engine.

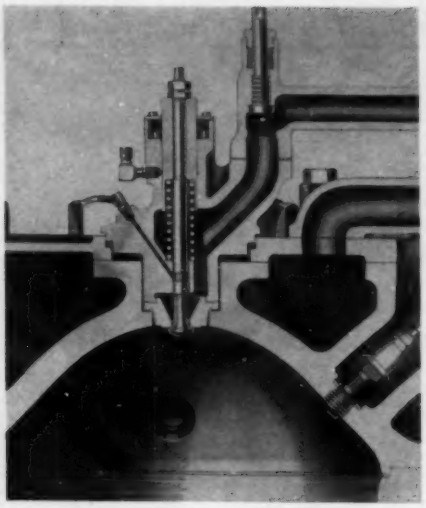


Fig. 4—Cross section showing the gas injection and gas regulating valves.

Fig. 5—Two cycle gas engine cylinder head showing location of globe valve.

an adjustment at each gas valve to the individual cylinders.

Increase the amount of gas to the cylinder until a sharp detonation is noted. Then close the valve until the detonation is again relieved. This will be the adjustment for maximum load capacity of that cylinder. Conduct the same procedure at each cylinder. As a final check, the operator should use a pressure indicator to balance out the firing pressures of each cylinder; they should be within 50 psi.

The third and last type of natural gas engine to be discussed is the two cycle ported cylinder engine.

The method of balancing these engines is the same whether they are standard, high compression, or supercharged by use of rotary valves in the exhaust elbows. In this type the gas supply, held constant by a regulator, is piped to the engine under pressure; however, the actual valve might vary between 30 to 50 psi depending upon the engine model and the number of cylinders. From the regulator the gas is piped to a regulating valve (Figure 3) which is actuated by the governor. On the down stream side of this valve the gas is piped to the individual cylinders through a manifold.

The speed of the engine, therefore, is controlled by varying the pressure on the downstream side of the regulating valve. There is only one adjustment on this type of engine and that is gas regulation immediately before the gas injection valve at each cylinder (Figure 4). Of course, there is also a globe valve installed before each injection valve, but it should always be wide open; it is merely put there to cut the gas off to the individual cylinders if it is desired to cut that cylinder out.

In this engine it is particularly important to adjust the gas regulator to give a pressure to the regulating valve that will allow it to open to about 8 or 8½ points on the regulating valve quadrant, with full load on the engine. The engine can then be roughly balanced by ear, that is, the injector gas valve adjustment at each cylinder can be opened until the cylinder pounds quite heavily, then the valve should be turned toward the closed position until the cylinder sounds normal.

In the case of high compression engines a sharp detonation will be noticed as the gas adjustment is opened and it will be much easier to balance the individual cylinders by ear. After this is done the final adjustment should be made by putting a pressure indicator on each cylinder and measuring the peak firing pressures. They should all be within 50 pounds of each other.

Another method. In addition to the peak pressure method of balancing these engines there is also another good method that can be used if the load is very steady. In this case a large gage can be installed on the downstream side of the gas regulating valve, place about three-quarter load on the engine and cut out one cylinder. As this cylinder is cut out by means of closing the globe valve in the gas line to that cylinder (Figure 5), a change in pressure will be noted on the gage, the change should then be recorded. Next, put that cylinder back into operation by opening the globe valve, and cut out another cylinder noting the change in gas pressure due to its being cut out.

Repeat the process with the remaining cylinders. After all the differences in pressures have been recorded, the amount of gas to the individual cylinders should be varied until the change in pressure reading on the gage is exactly the same as each cylinder is cut out. If a gage is not available, an extension of about 18 inches long can be attached to the end of the regulating valve indicator, and a quadrant with ten equal divisions can be mounted behind this extension. As the individual cylinders are cut out this extended pointer will change position, and if the engine is in balance it will change an equal amount each time the cylinders are cut out.

Once the engine is in balance it should be left alone because there is no reason why it should change due to any loosening of the adjustments. However, failure of any part of the ignition system will result in an unbalanced engine and in that case the cause should be remedied. Often operators are too hasty in changing the gas valve adjustment when failure of the ignition system is the direct cause. Carboning of the intake ports will make an engine detonate severely, particularly in the high compression models, therefore, detonation can be used as a good indicator of ignition failure and clogged intake ports.

—The End

SAFETY ENGINEER prepares first aid equipment and safety display signs for distribution along H. C. Price spreads.

Safety Man Goes First

On the H. C. Price spreads he starts his job well ahead of construction crews and plays a vital role in reducing the accident frequency rate.

SIGNS AND DECALS are widely used by safety engineers to focus attention on company safety practices.

By ANTHONY GIBBON,
PIPE LINE INDUSTRY Staff

H. C. PRICE COMPANY has lowered its accident frequency rate on pipe line spreads by putting safety engineers to work ahead of actual construction. These safety engineers carry out company safety policies. They work closely with the superintendent, the foreman of each unit, and the men themselves.

The safety engineers are at work long before construction crews move in. Among other duties, they contact local doctors to expedite the handling of any possible emergencies. They arrange for use of roads, highways, bridges, and see that they are well marked.

The safety engineer surveys property through which the pipe line right-of-way will pass. He photographs obstructions that might be damaged during construction and secures statements on the condition of the property from landowners. Such precautionary measures often prove valuable in property damage disputes. Where there are highway and railroad crossings, he makes advance arrangements for the possible temporary removal of low telephone or electric lines so heavy equipment can clear.

After construction starts the safety engineer works closely with all crews, seeing that well-marked right-of-way boundaries are observed, gates kept closed, and that property damage and injuries in general are kept at a minimum.

Where blasting is necessary, he makes a close check of property in the immediate area both before and after the blast. He carefully supervises the use of backfill over dynamite charges.

The safety engineer is an important contact between the property owner and company landman. He plays a vital role for the company, too, in keeping close contact with each landowner whose property is crossed.

Safety engineers have put new meaning in the word "safety" at H. C. Price Company. An enviable accident prevention record has resulted which in turn has meant high employe morale and efficient construction. —**The End**

How to Speed Up Gas Purchase Accounting

Warren Petroleum Corporation has applied the punched-card technique to its purchase and payment for natural gas used in natural gasoline plants.

By P. A. Brockwell, Warren Petroleum Corporation, Tulsa

WARREN PETROLEUM CORPORATION was operating 20 natural gasoline plants. These plants were supplied by natural gas flowing through 3000 different meters. The problem of making purchase settlements had become mired in a maze of formalities.

To make matters worse, the gas was purchased under various types of contracts. The majority of the contracts called for settlement based on interest owners' participation in plant sales.

Warren had the answer: a punched card system. Here's how it was done.

Initially, gas meter readings are recorded on approximately 20,000 charts per month. The gas charts are taken from the meters by plant employes and forwarded to the home office. These charts are for varying periods, daily, weekly or eight days, depending on the type of meter.

In the home office the charts are run on a machine known as an integrator to obtain the extension for each chart and the extension is printed on the chart. A total of the extensions shown by the charts for a plant group is obtained before the charts are forwarded for punching the required information into the card (see key punch instructions). After verifying and balancing, the cards are filed until all charts have been received for the month.

Volume—The next step is to process the cards to calculate the gas volume for each meter for the month. (Table 1, Steps 1 to 23, inclusive.) The volume is obtained by multiplying the extension referred to above by the coefficient which was obtained from the master card. It should be understood that consideration must be given to certain exceptions in arriving at the volume. These excepions and their handling are set out in Table 1 under "Deduct Meters" (meters preceding final meter where gas passes through and is measured in more than one meter) and "Temperature and Supercompressibility Correction" (a factor to be applied against volume of gas produced in excess of 200 pounds pressure).

Warren's first step is recording gas meter readings on 20,000 charts per month.

Value of Products—Having obtained the volume of gas for each meter the next step is to arrive at the value of the gas based on its content of natural gasoline, LPG, and residue gas. Basic information as to price, etc., is indicated in each contract master card, which along with certain sales data for each plant group is applied to the volume to compute the value of the products for the three groups of products (natural gasoline, LPG, and residue gas).

Basic formulas for calculating the natural gasoline, LPG, and residue gas content which must be followed to arrive at the gross value of the product follow:

Natural Gasoline = Mcf times gpm equals total test gallons. Test gallons times price per gallon and the results times contract percent equals gasoline content value.

LPG = Excess gallons sold times average price per gallon times percent due all leases equals value due all leases divided by total volume or test gallons into plant times gas purchased or gasoline content of gas purchased from each lease equals LPG value.

Residue Gas = Total gas metered times percent of residue remaining equals residue after extraction and plant use minus residue returned to lease equals residue available for sale from lease; net proceeds from total residue sold from plant divided by total residue available for sale from plant and that result times residue available for sale from lease equals residue value.

In Table 1 these computations are set out as follows:

Natural gasoline calculation,	Steps 24-25
LPG calculation,	Steps 26-27
Residue gas calculation,	Steps 28-38

Gross Products Tax—The next operation is to compute the gross production taxes applicable to the gas value and volumes. Plants are grouped by states as the tax calculation varies for each state. The procedure followed is set out under "Tax Calculations." Step 39 (Table 1).

Meter Statements—With the computation of the tax calculation all necessary information has been obtained. The cards are assembled as follows: operator, lease, detail meter cards, natural gasoline, LPG, residue gas, and meter total card. The meter state-

Details Continued on Page 66

Table 1. Detailed Procedure

Key Punch Instructions

Detail Card for Meter Charts:

Cards are punched from the meter charts showing card number, plant, month, day, year, meter number, orifice change number in column 24, temperature, pressure, and difference.

Verify cards, plant, day, meter number, temperature, pressure and difference.

Processing Instructions
Computation of Volume

Step 1. Balance cards to a predetermined control which is a tape of the difference for each meter chart for each group.

Step 2. Remove meter cards that are to have temperature and compressibility corrections by sorting on columns 38 and 52. Reproduce all cards other than blank in the above columns. Reproduce column for column 1 through 32 and 67 through 72. Put new reproduced cards with cards that are blank in column 38 and 52. Hold cards other than blank in columns 38 and 52 for further use, they are to be corrected for temperature and compressibility later, Step 17.

Step 3. When all meter charts are in for the month, sort detail cards (#18) to columns 24, day, meter, and plant. (Column 24 is the number of coefficient changes for a meter in a day.)

Step 4. Sort new master coefficient cards (#16) to column 24, day, meter, and plant. Collate master coefficient file.

Step 5. Collate master coefficient cards (#16) in front of detail (#18) cards.

Step 6. Calculate—multiply difference by coefficient to get mcf. At the same time gang punch 1st. meter adj., 2nd. meter adj., gpm, machine constant, line, orifice, specific gravity, and coefficient. Remove master coefficient cards (#16) and retray.

Step 7. Tabulate detail cards (#18) with minor control on meter and intermediate on plant. Summary punch meter total card (#20), show card number, plant, month, year, meter, 1st. meter adj., 2nd. meter adj., and mcf. Balance summary cards. Meter adjustment is for meters that are to be subtracted from one another.

Deduct Meters

Step 8. Take meter total cards (#20) and sort on column 21. Remove other than blank in column 21. Set cards that are blank in column 21 aside for later use. Other than blank in column 21 are 1st. adj. cards.

Step 9. Take other than blank in column 21 and sort on column 22. Remove other than blank in column 22. Reproduce other than blank in column 22 twice, gang punch card (#18) in first and (#20) in second. Reproduce plant, month, year, transfer meter number from column 12 through 16 to 17 through 21 and transfer column 28-32 to 12-16, punch X in 74 for credit, reproduce mfc. Hold these reproduced (#18) cards for Step 16. Hold reproduced cards (#20) for Step 15.

Step 10. Take cards other than blank in column 22 from above step and reproduce card (#18), plant, month, year, transfer columns 12-16 to 17-21, punch X 74 for credit and reproduce mcf. Hold the cards (#18) for Step 16. Reproduce again, reproduce card (#20), plant, month, year, transfer columns 12-16 to 17-21 and 28-32 to 12-16, punch X 74 for credit and reproduce mcf. Continue to Step 11 with cards (#20).

Step 11. Sort reproduced cards (#20) from Step 10 to plant and meter. Take cards other than blank in column 21 from Steps 9 and 10 and sort to meter and plant. Match collate reproduced cards and cards other than blank in column 21. Hold selected aside and continue to Step 12 with merged cards.

Step 12. Summary punch collated cards by meter and plant. Show on card (#20), plant, month, year, meter, 1st. meter adj., and mcf. Cards summary punched from are of no value.

Step 13. Reproduce summary cards from above step twice, first show card (#18), second card (#20), plant, month, year, transfer meter number from 12-16 to 17-21 and 17-21 to 12-16, punch X in column 74 for credit and reproduce mcf. Reproduced card (#18) goes to Step 16. Continue Step 14 with reproduced cards (#20).

Step 14. Take reproduced cards (#20) from above step and sort to meter and plant. Take selected cards (#20) from Step 11 and sort to meter and plant. Match collate the two groups. Set selects aside and continue to Step 15 with collated cards.

Step 15. Summarize collated cards from above step. Show card (#20), plant, month, year, meter and mcf. Cards summarized from are of no value. Collate summary cards with selected cards from Step 14 by meter and plant.

Step 16. Tare reproduced cards (#18) from Steps 9, 10, and 13 and sort to meter and plant and collate behind detail cards (#18).

Temperature and Supercompressibility Correction

Step 17. Take the cards that were set aside from Step 2 (other than blank in columns 38 and or 52) and sort to meter and plant. Summarize meter, plant, number of cards, and accumulate temperature and pressure. Divide number of cards into accumulated temperature and pressure to get average temperature and average pressure.

Step 18. Reproduce cards and put average temperature and average pressure in their respective fields, leave out accumulated temperature and pressure. Cards reproduced from are of no value.

Step 19. Collate master coefficient cards in front of correction by meter and plant. Gang punch specific gravity in correction cards. Remove master and retray.

Step 20. Sort correction cards to temperature, pressure, and specific gravity. Collate in compressibility master cards. Gang punch compressibility correction factor. Remove master cards and retray.

Step 21. Collate detail meter total cards (#20) from Step 7 in front of temperature and compressibility correction cards. Select unused meter total cards. Calculate—multiply mcf from meter total card times temperature correction factor and the result times the compressibility factor to get the corrected mcf.

Step 22. Separate meter total cards (#20) from corrected cards. Some of the corrected cards are used for the products calculation and the remainder are used for information only. Replace meter total cards with corrected cards where the products calculations are effected. Hold the other cards to add later.

Step 23. Reproduce the meter total card 3 times first for the gasoline work card (#21), show card number, plant, month, year, meter, contract number, total gas purchased, and gpm. Second reproduce the lpg (#22) work card, show card number, plant, month, year, and meter number. Third reproduce the residue gas work card (#23), show card number, plant, month, year, and meter.

Gasoline Calculation

Step 24. A card is punched for price per gallon for each contract under each plant. Sort the gasoline work card (#21) to contract and plant. Collate in key punched price cards. Gang punch per gallon, at the same time calculate mcf times gpm to get test gallons. Remove price cards and destroy.

Step 25. Sort gasoline work cards (#21) to price, gpm and contract. Collate in master contract percent cards. Gang punch contract percent, at the same time calculate total test gallons times price per gallon and the results times contract percent to get gasoline value.

LPG Calculation

Step 26. Key punch a card with excess gallons sold, average price per gallon, percentage due leases, volume due leases, total volume or test gallons into plant, and ratio, for each plant. This information remains constant for each plant. Collate these plant total cards in the lpg work cards by plant and gang punch the above information. Remove the punched cards.

Step 27. Collate the gasoline work cards (#21) in front of the lpg work cards (#22) by meter and plant. Multiply mcf or test gallons from the gasoline work card times the ratio from the lpg work card and punch the lpg value.

Residue Gas Calculation

Step 28. Take the residue gas cards (#23) that were reproduced in Step 23, collate with the coefficient master cards and gang punch percent of residue remaining. Remove and retray master cards.

Step 29. Collate meter total cards (#20) in front of residue gas work cards (#23). Multiply percent of residue remaining times mcf and punch results in columns 17 to 24. Remove meter total cards.

Step 30. Tabulate residue gas cards (#23) by plant, accumulating columns 17-24 and forward this information to Gas department for their determination of factor.

Step 31. Gas department will furnish factor for each plant. Punch these factors for plant and insert by plant. Multiply figure in columns 17-24 times the factor and punch results in "residue after extraction and plant use." Remove factor cards.

Step 32. Gas department will make a schedule of residue gas returned to leases. Punch cards from this schedule and balance. Sort to meter and plant. Collate residue returned to lease cards against residue work cards (#23) and reproduce residue returned to leases from key punched schedule cards. Collate selected residue work cards back in by meter and plant.

Step 33. Calculate—subtract residue returned to leases from residue after plant use and extraction to get residue available for sale.

Step 34. Tabulate residue work cards by plant accumulating residue available for sale. This is the total residue available for sale from all leases. Punch this total plus, total residue sold from plant, and 50 percent of net proceeds from all residue sold from plant (last two figures furnished by Gas department) into one card for each plant.

Step 35. File cards punched from Step 34 into residue work cards (#23) by plant and gang punch "residue available for sale all leases," "total residue sold from plant" and "50 percent of net proceeds." Remove plant total cards. These cards are of no further use.

Step 36. Calculate—divide "residue available for sale all leases" by "50 percent of net proceeds" and multiply the results times "residue available for sale, lease" to get the residue value.

Step 37. Collate the residue work card (#23) behind the gasoline work card (#21) and lpg work cards (#22) from Step 27.

Step 38. Summarize the gasoline, lpg, and residue work cards into total gross card (#25) by meter and plant. Show in card (#25), plant, meter, mcf, gross value (total of gasoline, lpg, and residue values).

Tax Calculations

Step 39. Group plants into Oklahoma plants, Texas plants, New Mexico plants, Illinois plants, and Indiana plants. Calculate:

Oklahoma plants	— 5% of gross and .0002 of mcf.
Texas plants	— 5.72% of gross
New Mexico plants	— .00125 of gross and 2.5% of gross
Illinois plants	— no tax
Indiana plants	— .0002 of gross

Make the above tax calculations and punch the taxes, subtract the taxes from gross value to get net value. Return cards to meter and plant order.

Meter Statements

Step 40. Reproduce a deck of the meter total cards (#25), the reproduced cards go to calculate the division of interest.

Step 41. Collate original deck of meter total cards (#25) behind gasoline lpg, and residue work cards from Step 38. Collate lease, operator, and description cards in front of gasoline, lpg, residue, and meter total cards.

Step 42. Write meter statements.

Division of Interest Statements

Step 43. Reproduce the master division of interest cards (#50) to obtain the (#60) cards. Show company, card number, plant, state, county, pay code, interest owners' decimal interest, type of interest, interest owners' code, meter number, year, month, and reciprocal (punched from 71 to 80).

Step 44. Collate meter total cards (#25), in front of cards (#60), reproduced division of interest, by meter, select primary and secondary. Any unmatched cards will have to be investigated. A lease showing no gas should have blank mcf, gross value, tax, and net value, these cards are processed as though they had gas.

Step 45. Gang punch from card (#25) into card (#60), mfc, gross value, tax and tax.

Table continued on next page

Table 1

Continued from preceding page.

Step 46. Division of Interest calculation—leave the card (#25) and the card (#60) together and multiply the interest owners' decimal interest from the card (#60) by the net value from the card (#25) and punch in the net value column by the cards (#60).

Step 47. Leave the (#25) and (#60) cards together after multiplication. Collate the master division of interest cards (#50) in front of the division of interest cards (#60), by interest owners' decimal interest, interest owners' code, and meter number. This is to enable the printing of the interest owners' name on the division of interest statements.

Step 48. Collate operator cards (#10) and lease name cards (#11) in front of other cards by meter number. The cards should now be set up as follows: operator cards (#10), lease name card (#11), meter total card (#25), division of interest name cards (#50), and division of interest cards (#60). The cards are now ready to write the division of interest statements.

Step 49. Write the division of interest statements. List each plant separately using the division of interest control panel. Machine set ups are on control panel. At the end of each plant take a final total. There are two totals: one a total of the net value of the cards (#25) and the other a total of the net value of the cards (#60). They should agree, if they don't agree incorrect meter has to be corrected.

Checks

Step 50. After the division of interest statement is written and balanced, separate cards by sorting on column 2. Tray operator and lease master cards (#10 and #11), tray master division of interest cards (#50). Box lease total card (#25). Sort the division of interest cards (#60) to pay code. Get the clear out cards (suspense items) that were punched when the lease cards were punched. Tabulate as follows using the gas purchase control panel; clear outs, pay code 1, pay code 2, pay code 3, and pay code 4; enter totals on control sheet in space provided. The total of all should agree with the plant total.

Step 51. Sort pay code 1 and clear outs together by interest owner. Summarize using the gas purchase control panel. The summary card is the check card (#30). This card should show company number, card (#30), plant, interest owners code, net value, check number, and check date. To get check number punch card with last check number from last month in columns 67 to 72 and an X in 80, place card in front of cards to be summarized, this will set up the check numbering. Retab each plant and check total.

Step 52. Collate check card (#30) in front of master name and address cards (40 series) selecting primary and secondary. Collate division of interest cards (#60), pay code 1 and clear outs behind name and address cards. The cards are now set up as follows: check cards (#30), master name and address cards (40 series) and division of interest cards (#60) pay code 1 and clear outs. Cards are now ready to write check.

Step 53. Write the gas purchase checks.

Step 54. Take pay code 4 (withheld items) and sort to interest owner and plant, list on fanfold paper using the gas purchase control panel. List with a minor control on interest owner and forward to Gas department.

Payable Ledger and Suspense Ledger

Step 55. Take pay code 3 (suspense), the cards should be in meter and plant order, collate the current month cards behind the accumulative suspense file by meter and plant. List on fanfold paper using the gas purchase balance control panel. Forward listing to Gas department.

Step 56. Take pay code 2 (payable annually), cards are already in meter order and sort on interest owner. Collate current month pay code 2 into year to date pay code 2 by meter and interest owner. List with a minor total on meter and intermediate total on interest owner. List each plant separately and show a grand total for each plant. Forward to Gas department.

Step 57. Break down the cards used to write the checks, box the division of interest cards (#60), collate the master name and address (40 series) back with selected ones by interest owner. Check chards (#30) go to make up cash disbursement cards.

Step 58. Reproduce check cards (#30) in to cash disbursements cards showing all cash disbursement information, also plant and interest owner into columns 64 to 71 for reference purposes. Tray cash disbursement cards. Box check cards (#30). Collate with accumulated suspense items and list current suspense ledger for Gas department.

Table 3

INDEX TO CARD FORMS

10 — Lease Operator Name Card
11 — Lease Name Card
16 — Coefficient Card
18 — Meter Chart Card
19 — Gasoline Contract Card
20 — Meter Total Card
21 — Gasoline Work Card
22 — L.P.G. Work Card
23 — Residue Gas Work Card
25 — Total Gross Card
30 — Check Card
40 — Name and Address Card (Interest Owner)
50 — Division of Interest Card
60 — Reproduced Division of Interest Card

ment is then prepared showing the factors used in arriving at the volume of gas as well as pertinent information as to the value of the gas content of the three products, the amount of taxes applicable thereto and the gross and net value of all products. The procedure followed is set out in Steps Step 40-42 (Table 1).

Division of Interest Statements—The gross total card used to compute the taxes and net amount of meter shown on the meter statement is collated in front of the division of interest work cards which were reproduced from the master cards. This operation results in a current month work card. These cards are calculated using a special calculator; the interest owners' decimal interest is applied to the net amount of the meter to arrive at each interest owners' net amount. The master operator, lease, and division of interest (containing the interest owners' name) cards are collated and the division of interest statements written. The procedure covering this operation is set out in Steps 43 to 49 (Table 1).

Checks—The master cards from the division of interest are separated from the above. The division of interest work cards are sorted to pay code (designation of disposition of amounts due—pay currently, hold for yearly payment, hold in suspense, etc.) and current pay cards are sorted to interest owners' code. These cards are then summarized to obtain a check card. The check cards, the interest owners' name and address cards, and the current pay division of interest cards are collated and the checks written. See Steps 50 to 54 covering this operation (Table 1).

Payable Ledger and Suspense Ledger—The detail division of interest cards that are coded for yearly payment are sorted to interest owners and are collated in the current year file. The payable report is then made. The detail division of interest cards that are coded for suspense are collated in the accumulated suspense file by meter and the suspense ledger is made. The procedure covering these operations are set out in Steps 55 to 58 (Table 1).

Warren has just started the above procedure and we are confident it will fulfill our expectations. Our principal objective is to speed up our settlements which will enable the Accounting department to make early monthly closings and furnish financial and operating data to management at an earlier date.

Full credit is due W. J. Connelly and T. H. Brown for their able assistance, without which this article could not have been prepared.—**The End.**

TABLE 2
Master Cards

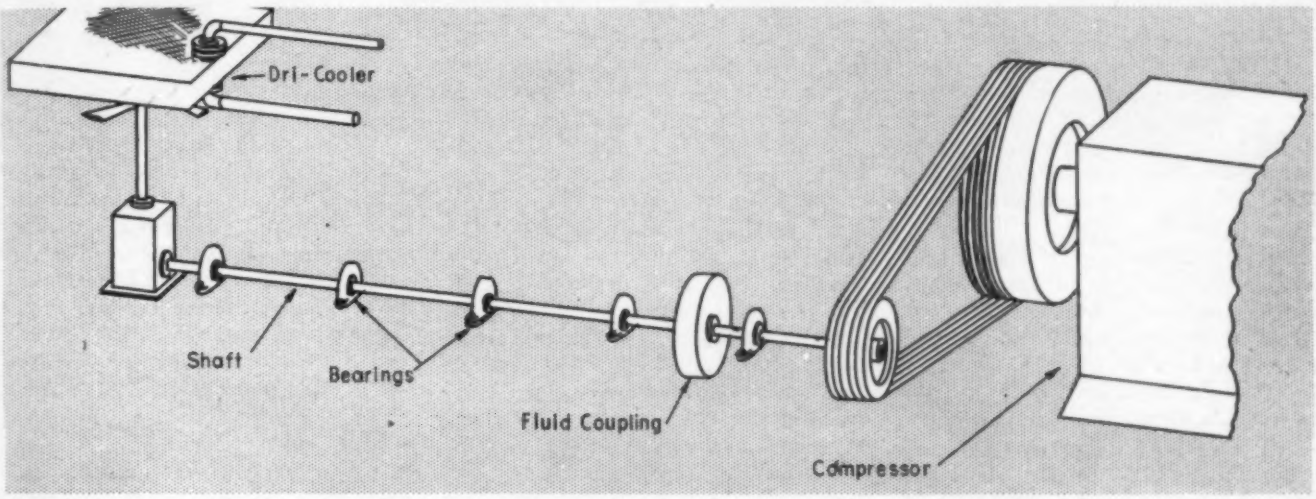
Form No.	Name	Information
16	**Coefficient** (For each Meter)	New master coefficient cards are punched from a form furnished by Gas department each month. New coefficient cards will be punched showing card (No. 16,) plant, month, day, year, meter number, 1st meter adjustment, contract number, 2nd meter adjustment, percentage of residue remaining, gpm, machine constant, line size, orifice size, gravity and coefficient.
19	**Gasoline Contract** (By Contracts)	Type of contract, price per gallon, gpm, and contract percent.
18	**Temperature Correction** (By Temperature Groups)	Temperature, pressure, and temperature correction factor.
16	**Supercompressibility Correction** (By Temperature Groups)	Contain temperature, pressure, specific gravity, and supercompressibility factor.
10	**Lease Operator**	Name, plant number, meter number, pressure base of meter.
11	**Lease Name**	Name, plant number, meter number.
50	**Division of Interest**	Plant number, meter number, interest owners' card number, type of interest, pay code, decimal interest, interest owners' name.
40	**Interest Owner**	Name and address, plant number, interest owner code number.

Rules of Thumb

FOR THE PIPELINER'S NOTEBOOK

$15 Per Rule of Thumb

These formulae from the pages of engineers' own notebooks yield rough, but reasonably accurate answers for design, maintenance and supply questions. The Editors will pay $15 for your pet Rule of Thumb. Send your Rule of Thumb to Donald M. Taylor, Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1.



Engineering Design

—21—How to estimate the horsepower that can be transmitted by a shaft.

1. Where there are no stresses due to bending, weight of the shaft, pulleys, gears or sprockets, use:

$$HP = \frac{D^3 N}{50}$$

Where D = diameter of shaft in inches, and
N = revolutions per minute.

2. For heavy duty service (similar to the atmospheric cooler pictured) use:

$$HP = \frac{D^3 N}{125}$$

Example: What horsepower can be transmitted to an atmospheric cooling coil by a two-inch shaft turning at 1800 revolutions per minute?

$$HP = \frac{(2)^3 (1800)}{125}$$
$$= 115.2 \text{ horsepower}$$

Engineering Design

—22—How to estimate the horsepower required to pump at a given rate at a desired discharge pressure.

Ignoring effects of temperature, viscosity etc.

$$HP = \text{psi} \times \frac{\text{barrels per day}}{1000} \times .022$$

The factor .022 is arrived at by using a pump efficiency of 80 percent and a gear efficiency of 97 percent.

Example: What horsepower would be required to pump 15,000 barrels per day with an 800 psi discharge?

$$HP = 800 \times 15 \times .022$$
$$= 264 \text{ horsepower}$$

The factor .022 was derived from the formula:

$$HP = \frac{(\text{psi})\ (\text{BPD})}{58{,}800 \times \text{pump efficiency} \times \text{gear efficiency}}$$

Don't Waste Your Employe Talent

Is there unproven talent in your organization? Here is a program designed to help you find it.

By EUGENE J. BENGE, Benge Associates, Asheville, N. C.

MORE ENGINEERS, more chemists, more technicians—the cry goes up, not only from the petroleum industry, but from all industry. And technical school enrollments suggest the condition will worsen in the years ahead.

Attitude surveys reveal that at least 80 percent of employes are unhappy about the opportunity picture they see. "This outfit doesn't know I'm alive," they complain. Or perhaps "They always bring in outsiders to fill the worthwhile vacancies."

All the while, union contracts are being written with seniority clauses to limit choices for promotion, length of service clauses to determine pay increases.

Employers are caught on a three-horned dilemma of scarcity, opportunity and seniority. A "search for talent" with proper followup can relieve, perhaps even solve, this dilemma.

A Continuing Program

The basis of the program is the proven fact that there is unused talent in the ranks. The program sets up devices to uncover this talent, generally in some such order as the following

1. A search for talent.
2. Interviews.
3. Adequate personnel records.
4. Merit rating.
5. A talent file.
6. Proper promotion policies.

Any company which has already developed certain portions of such a program is in a favored position to add the others, to form a completely integrated program of internal selection based on ability. Few companies can hope to fill all their needs for key men by means of the devices here outlined, but every company can offer to ambitious employes the assurance that there is at work a fair and adequate system of internal promotion.

By locating men and women capable of filling such jobs as inspector, subforeman, production clerk or laboratory tester, pressure is relieved on higher supervisory or technical levels. By providing objective ways to gauge merit, pressure is relieved on the deadening lockstep of seniority as the main or sole determinant of promotions.

THE SEARCH FOR TALENT. The chances are high that of 100 employes selected at random, at least three could qualify for higher tasks. In companies where no organized plan of internal selection has been at work, the figure may be much higher. It may be lower in oil production field crews, higher in refineries, much higher in administrative and marketing organizations.

Not always is it possible to utilize the abilities uncovered. Talent searches have discovered persons whose logical careers should be cartooning, illustrating medical text books, interior decorating, criminologist, fiction writer and night club hostess.

Basically, the search for talent is an aptitude testing program. Employes are invited to volunteer for it; there is no compulsion. It is carefully explained to supervisors (who themselves may volunteer) so they will encourage worthwhile employes to take advantage of the opportunity, and can answer questions about the plan. It is also outlined in notices to employes and played up in the employe paper.

Usually from 5 to 30 percent of employes will submit their names—the lower figure in industrial organizations employing many girls, the higher figure in office or financial organizations. For a refinery, 10 to 12 percent would be a good showing.

Case Study

Typical of procedure and results was the survey conducted in the Morgan Manufacturing Company of Black Mountain, N. C. This concern has a working force of 450 employes, almost all males.

Tests were given in the cafeteria. Sometimes a conference or assembly room is available for this purpose.

In the Morgan study, because of shifts, it was necessary to administer the basic tests in morning and afternoon groups. It is preferred that all volunteers take the three basic tests at the same time, when possible.

The three basic tests were—

1. A ten minute interest test, revealing whether a person desires to work with
   a. People
   b. Ideas
   c. Mathematics
   d. Physical objects

There are no right or wrong answers to this simple test and it is used as a "shock absorber."

Typical question:

Which of these four occupations would you prefer

	Scored as interest in
Auto mechanic	Physical objects
Auto salesman	People
Efficiency engineer	Ideas
Calculating machine operator	Mathematics

2. A second interest test revealing strength of interest in the following vocational fields:
   a. Mechanical
   b. Computational
   c. Physical sciences
   d. Biological sciences
   e. Persuasion
   f. Art
   g. Literary
   h. Musical
   i. Social service
   j. Clerical

Continued on Page 73

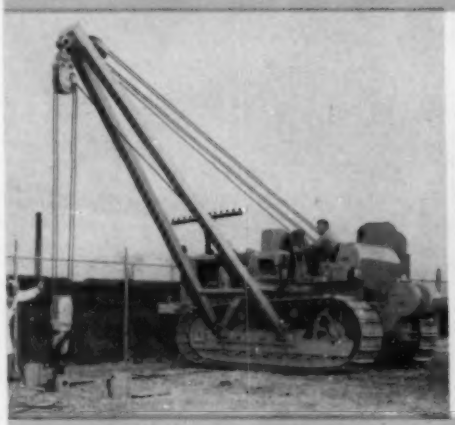
THIS IS NOT A TRACTOR

IT'S THE...

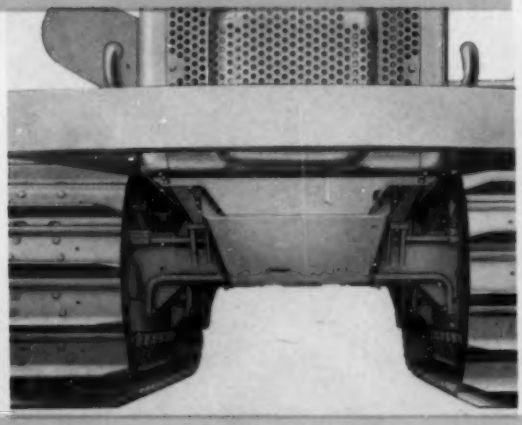
ALL-NEW CAT No. 583 PIPELAYER

THE FIRST COMPLETE PIPELAYING UNIT, NOT JUST A TRACTOR ATTACHMENT

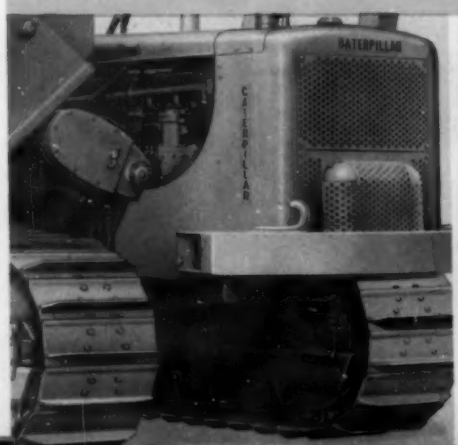
New High Lifting Capacity of 130,000 Pounds Maximum!



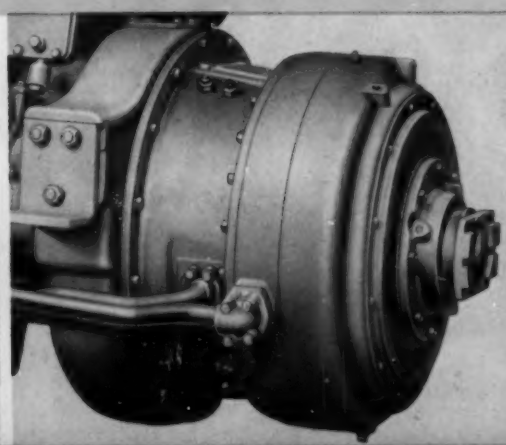
New High 21-inch Clearance for Swampy, Muddy Terrain!



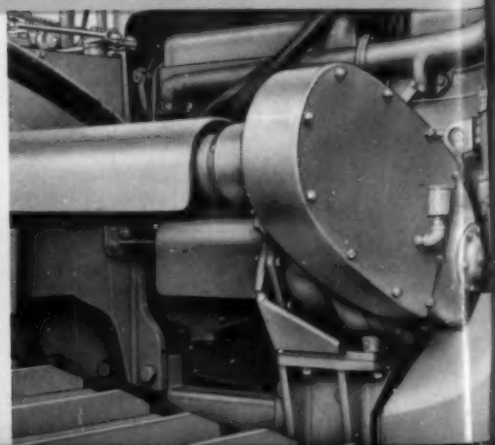
New Improved Stability *with 86-inch gauge, 28-inch track shoes; a long 7-roller track frame; centered engine.*



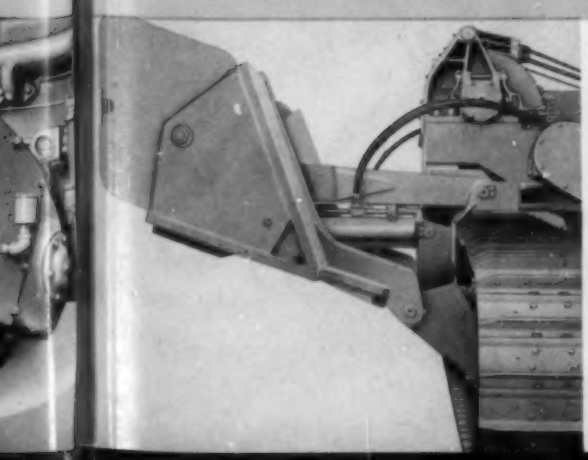
New Three-stage Torque Converter in Main Drive, *giving variable speeds in 3 forward and 3 reverse ranges.*



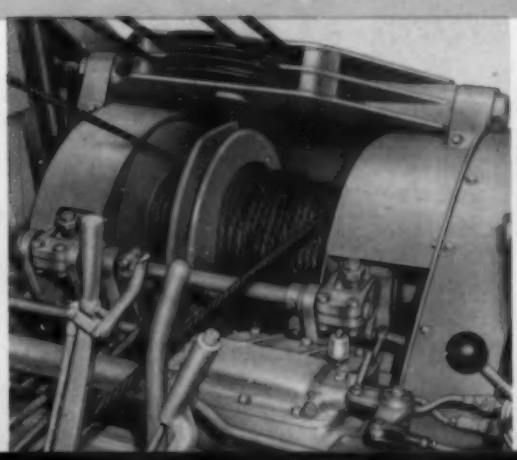
New Live Shaft, Constant Power Drive *direct from engine to pipelayer winch transmission.*



New Hydraulically Actuated Counterweights *which pivot at bottom to give good side and ground clearance.*

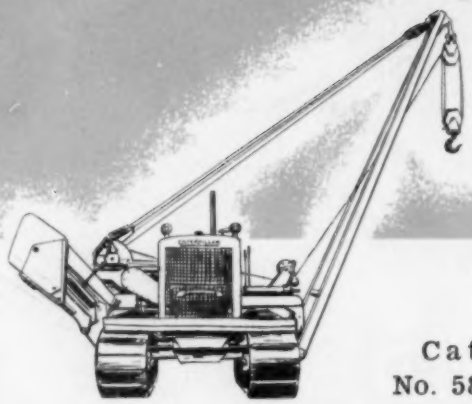


New Heavy-duty Constant-mesh Pipelayer Winch Transmission *with three forward speeds, one high-speed reverse.*



New Convenient Easy-to-operate Controls, *including electric starting system for the starting engine.*

YOU HELPED DESIGN THIS UNIT!



Caterpillar's No. 583 Pipelayer was designed for only one purpose—to give pipeliners an efficient job even when the going is tough. It's not a tractor attachment. *It's all pipelayer!*

Caterpillar engineers worked closely with pipeline people in designing this. Backed by the most complete and extensive research facilities in the industry, it incorporates the latest developments in quality manufacture. Every part has been exhaustively tested to meet exacting performance standards.

As a result, here at last is the *complete* pipelayer, which answers the problems you wanted licked. Only Caterpillar engineering know-how, research and plant facilities could create the most efficient, highest capacity pipelayer in history. See your Caterpillar Dealer for complete information about the new No. 583!

NO DETAILS HAVE BEEN OVERLOOKED (Check them!)

- Drive of the pipelayer winch transmission is independent of master clutch and torque converter. Rear of the No. 583 is left clear for winch or other rear-mounted equipment!
- New hydraulic counterweights retract well over track to give better equalized ground pressures. Counterweights stay put in retracted position without hydraulic pressure.
- Reverse gear-drum pawl interlock prevents breakage of boom drum by inadvertent reversing with drum pawl engaged.
- Boom and load line brake levers have handles easily distinguished by feel. Operator can manipulate them and still watch the job for maximum safety.
- 190-HP CAT* Diesel Engine includes new fuel injection system giving excellent torque rise.
- CHECK WITH YOUR CATERPILLAR DEALER FOR THE PIPELAYER TO FIT YOUR JOB

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

CATERPILLAR TRACTOR CO., Peoria, Illinois, U.S.A.

Please send me further information on the Cat No. 583 Pipelayer.

*Name*_____

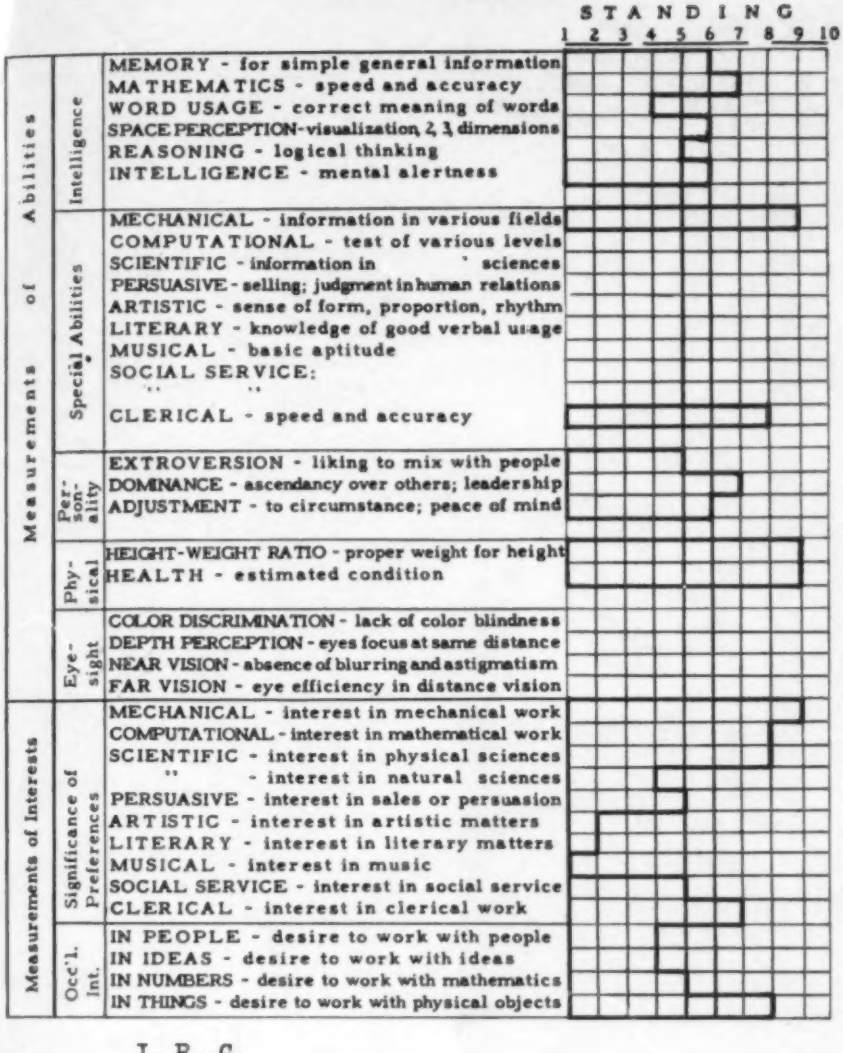
*Company*_____

*Street*_____

*City*_____ *Zone*_____ *State*_____

NEW NO. 583 PIPELAYER—ANOTHER EXAMPLE OF CATERPILLAR LEADERSHIP IN ACTION

PSYCHO-GRAPH


STANDING
1 2 3 4 5 6 7 8 9 10
Measurements of Abilities
Intelligence
MEMORY - for simple general information
MATHEMATICS - speed and accuracy
WORD USAGE - correct meaning of words
SPACE PERCEPTION - visualization, 2, 3, dimensions
REASONING - logical thinking
INTELLIGENCE - mental alertness
Special Abilities
MECHANICAL - information in various fields
COMPUTATIONAL - test of various levels
SCIENTIFIC - information in sciences
PERSUASIVE - selling; judgment in human relations
ARTISTIC - sense of form, proportion, rhythm
LITERARY - knowledge of good verbal usage
MUSICAL - basic aptitude
SOCIAL SERVICE:
CLERICAL - speed and accuracy
Personality
EXTROVERSION - liking to mix with people
DOMINANCE - ascendancy over others; leadership
ADJUSTMENT - to circumstance; peace of mind
Physical
HEIGHT-WEIGHT RATIO - proper weight for height
HEALTH - estimated condition
Eyesight
COLOR DISCRIMINATION - lack of color blindness
DEPTH PERCEPTION - eyes focus at same distance
NEAR VISION - absence of blurring and astigmatism
FAR VISION - eye efficiency in distance vision
Measurements of Interests
Significance of Preferences
MECHANICAL - interest in mechanical work
COMPUTATIONAL - interest in mathematical work
SCIENTIFIC - interest in physical sciences
- interest in natural sciences
PERSUASIVE - interest in sales or persuasion
ARTISTIC - interest in artistic matters
LITERARY - interest in literary matters
MUSICAL - interest in music
SOCIAL SERVICE - interest in social service
CLERICAL - interest in clerical work
Occ'l. Int.
IN PEOPLE - desire to work with people
IN IDEAS - desire to work with ideas
IN NUMBERS - desire to work with mathematics
IN THINGS - desire to work with physical objects

Name J. R. G.

Age 27 Marital Status M Education 12 Years

Report: This man is worthy of training beyond his present level of maintenance mechanic's helper. His intelligence is above average, he is well informed in the mechanical field, possesses good speed and accuracy in clerical work.

Social development is average, or slightly better, especially as to his desire to dominate. Physically he seems to be in good shape.

His strong interests are in mechanical work, mathematics and physical sciences; he desires to work with physical objects.

With proper training this man should make good in industrial engineering, especially in studies of tools, equipment, jigs, fixtures, conveyorization and assembly line processes.

Figure 1

Typical question:

Rank from 1 (high) to 10 (low) your preference for each of the following courses of study:

	Scored as interest in
Slum Clearance	Social service
Office Practice	Clerical
Wood Working	Mechanical
Mathematics	Computational
Physics	Physical sciences
Zoology	Biological sciences
Salesmanship	Persuasion
Art Appreciation	Art
How to Write for Profit	Literary
Music Appreciation	Musical

3. An intelligence test which yields separate scores as to

a. Memory
b. Number facility
c. Vocabulary
d. Space perception (visualization)
e. Reasoning

Typical questions:	In scoring, credited to
What city is the capital of Canada?	Memory
22 + 37 — 14 + 3 — 17 =	Number facility
Sapient means much the same as— WISE? OILY? SPLIT? FOOLISH?	Vocabulary
If you start from City A, drive 10 miles north, 5 miles east, then 10 miles south, how far from City A will you then be?	Space perception
If John is older than Bill, but younger than Henry, is Henry necessarily older than Bill?	Reasoning

These three tests required about two hours for completion. Tests were marked by a scoring team in a separate room, using scoring keys.

Using the intelligence test scores as a criterion, blanks were segregated into two piles:

1. Those grading 45 and over correct responses. These were tentatively considered as "qualified."
2. Those scoring under 45. These will usually be about two thirds of those volunteering in a search for talent.

The qualified blanks (representing employes with some gray matter) were further divided on the basis of interests into those who should be given—

a. A mechanical test (or tests)
b. A clerical test
c. Social development tests
d. Other tests, for artistic ability, social service, science information, etc.

Here are two sample questions from mechanical, clerical and social development tests:

Mechanical

Babbitt is—

A (A powder to fill cracks)
B (An anti-friction alloy)
C (A tongued joint)
D (A compound to make pipe joints watertight)

Mullions are most likely to be found in a—

A (Window)
B (Escutcheon)
C (Wainscot)
D (Balustrade)

Clerical

1850 firebricks @ $20.20 per thousand = $_____

908523—980523 (are these numbers SAME or DIFFERENT?)

Social Development

I stammer when I'm flustered
I like to address groups

A profile or psychograph was drawn for each qualified employe. The man covered by Figure 1, for example,

NEW PIPE SERVICE from Newport Steel

*SIZES AND WEIGHTS AVAILABLE		
O.D.	Wall	Wt. Per Ft.
4½	.125"	5.84
	.142"	6.61
	.156"	7.25
	.188"	8.64
	.219"	10.00
	.237"	10.79
6⅝	.134"	9.29
	.156"	10.78
	.188"	12.89
	.219"	14.97
	.250"	17.02
	.280"	18.97

To speed up deliveries throughout the entire area, Newport Steel now maintains stocks of representative sizes and weights of electric weld line pipe in their Houston depot. The entire pipemaking facilities of this basic steel producer are devoted to making 4" and 6" sizes,* and the unusual quality of their electric furnace steel permits making pipe which more than meets API and ASTM specifications. Made in thin walls as well as standard walls, in a variety of gages, to provide maximum economy. Before you buy line pipe or other products listed here, contact Newport Steel for superior quality and excellent service.

ECONOMICAL WATERAIL DELIVERY

Newport Steel is situated on the Mississippi-Ohio River system and the great Cincinnati rail hub. With the advantage of location, new river barge facilities and seven major railroads, Newport gives economical, dependable delivery to the entire area of the Middle West and South.

NEWPORT PRODUCTS

Cold-Rolled Sheets
Hot-Rolled Steel in Coil
Hot-Rolled Pickled Steel in Coil
Hot-Rolled Sheets
Hot-Rolled Pickled Sheets
Galvanized Sheets
Galvannealed Sheets
Colorbond Sheets
Electrical Sheets
Alloy Sheets and Plates
Electric Weld Line Pipe
Roofing and Siding
Eave Trough and Conductor Pipe
Culverts

Newport Steel CORPORATION
NEWPORT, KENTUCKY

YOUR CONFIDENCE IS JUSTIFIED WHERE THIS FLAG FLIES

A SUBSIDIARY OF MERRITT-CHAPMAN & SCOTT CORPORATION

was a maintenance mechanic's helper recommended for training as an industrial engineer. Note that results of all tests are shown on a 1 to 10 (decile) scale to facilitate comparisons.

INTERVIEW. Based on the profiles and supporting test data, qualified employes were interviewed with their personnel records at hand. At this interview the significance of the test results was explained and suggestions offered as to personal development, courses of study or other ways to improve. Employes showed great appreciation for these interviews, discussed their ambitions and limitations quite freely. In quite a few cases the tests succeeded in clarifying a career choice which had been in doubt.

Some companies give this vocational counseling to all volunteers; others do it only with qualified volunteers but let it be known that any one may learn his test results if he will but inquire. Experience shows that rather few of the non-qualified do so; they seem to sense that they didn't do so well as those being interviewed upon management's initiative.

This company, selected as typical, revealed the following data:

450 employes
51 volunteered
34 failed to qualify
17 qualified as follows
11 for supervisory training
6 for mechanical work
2 for production control
4 for clerical

Six men qualified for two possibilities.

From studies made in a number of companies, it is concluded that:

1. Many employes possess a large variey of mechanical information.
2. Rather few reveal both speed and accuracy in clerical operations.
3. An appreciable portion of the qualified employes are extrovert, dominant and well adjusted—traits useful in supervision.
4. Outstanding interests (in descending order are)
   - Mechanical
   - Social service (This one puzzles us!)
   - Computational
   - Physical science
   - Biological science
   - Clerical

Thus it would seem that industry has in its own ranks a small but important supply of employes worthy of training as mechanics, supervisors,

To keep in step with your constantly changing business, your communication system should be examined periodically. In that way, your communications never become outdated — always meet your exact needs at the lowest cost. If you have Bell System service, such studies are a continuing activity.

Bell System communication engineers will also help you take a good, close look at your own communications . . . *at no cost to you!* Their detailed study will help you get the most efficient use of your facilities . . . whether they are long distance, mobile, teletypewriter, or metering and supervisory control.

A growing number of pipelines are taking advantage of Bell System communications in meeting the demands of modern operation.

• • •

If you are interested in a detailed communication survey by Bell System engineers without charge, call your local Bell Telephone representative now.

PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE

METERING CHANNELS

BELL TELEPHONE SYSTEM

personnel workers, industrial engineers and scientific assistants.

FOLLOWUP. Fifteen years' experience with talent searches and internal selection programs have suggested that some such slowly evolved approach as the following is desirable:

- Development of a comprehensive application blank, especially designed to analyze experience, schooling and physical status prior to employment.
- Installation of a history card system to record job and rate changes after employment; also suggestions, accidents, periodic physical examinations, added study, etc.
- A merit rating program (carefully explained and administered, lest rating become perfunctory).
- Utilization of aptitude tests, at first for applicants, later for promotions and transfers, or for periodic talent searches.
- Compilation of a talent file, properly cross-indexed. Ten or 15 percent of employes may ultimately be included in this file. When a vacancy arises the file should be reviewed, subject to seniority policies or agreements.
- Periodic interviews and specialized training for those in the talent file. Diamonds in the rough require polishing.
- Evolution of adequate promotion policies as the basis of the practices set up.

Every oil company has its quota of chronic grumblers. "No opportunity around this place," they say. But a company which has conducted a search for talent is in a strong position with any employe who complains that he has not been considered for advancement. "Enter your name for testing," he is told, "so that we will know in what direction your abilities lie." If he missed the first search, assure him that there will be others or that methods being set up will find out about his potentialities for higher tasks.

Management literature is currently replete with discussions of "non-financial incentives." It is difficult to conceive of any more galvanizing, loyalty-producing motivation than sure knowledge on the part of employes that there is in effect a carefully conceived program of internal promotion, one designed to utilize talents for the right types of job. —The End

CLEANING, COATING, WRAPPING & RECONDITIONING

★

HOT DOPE

Straight from the Kettle on PIPE PROTECTION

★

By Boyd Mayes

Ever so often I keep seeing in the paper that Congress may have to raise the legal debt so the government can keep operating. Seems to have gotten past the point of ever hoping or thinking about reducing the national debt. Brings to mind some fellows I've heard say they'd feel successful when they could owe a million dollars. At the rate we're going, looks like the national debt will have us all owing a least a million apiece before too many years. Looking at our debt that way—guess there ain't no question but that we've got the most successful government the world has ever seen—and gettin' more so every year. Personally, though, I'm mighty proud to live here no matter how successful we get.

And I'm mighty proud of another thing—that's the PERMANENCE we've been putting into pipe for well over a quarter of a century. We've got the plant, men and machines to do any size job for you—successfully.

MAYES BROS.

1150 McCarty HOUSTON, TEXAS Orchard 7566

YOU SAVE ...

...engineering time and assure uniform top quality when you select standard Micro-Blanks from our new 12-page catalog. There is a Micro-Blank to fit nearly every requirement.

MICRO BLANKS

Write for your free copy of our catalog TODAY!

Distributors inquiries invited

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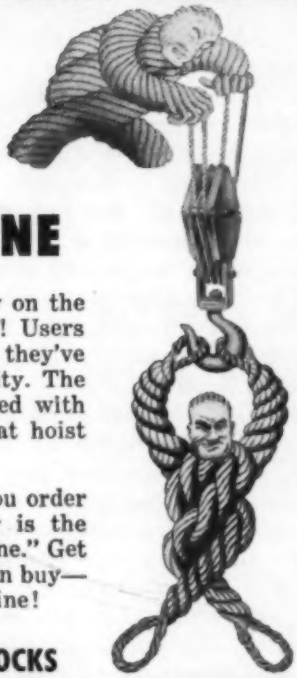
Telephone Victor 4491

NOW!
TORTURE-TEST a Tuffy® SLING FREE!

Run Your Toughest Tests! Prove Tuffy's Toughness Yourself!



Tuffy® HOIST LINE

Equals Tuffy Slings in ability to stay on the job longer . . . reduce operating costs! Users report Tuffy Hoist Line is the best they've ever seen for strength and wearability. The reason? Tuffy is specially constructed with the extra flexibility and stamina that hoist line work *demands.*

No Confusing Specifications! When you order Tuffy, all you tell your distributor is the length, diameter and "Tuffy Hoist Line." Get all the hoisting service your money can buy—reeve *your* crane with Tuffy Hoist Line!

YOUR Tuffy® DISTRIBUTOR STOCKS THE REPLACEMENT ROPES YOU NEED!

Just Give Him An Idea of your future requirements and he will stock up from his nearby Union Wire mill depot. That way, when you need rope in a hurry, he's ready to rush it to you immediately! Talk over your replacement schedule with your Tuffy distributor *today.*

Kink It, Loop It, Jerk It! Tie knots in your free Tuffy Sling or use it to hoist weights up to *twice* the rated working load! Do your worst to the Tuffy Sling we give you and you'll see why we say Tuffy is the toughest sling you can buy!

Exclusive, Patented Construction of machine braided wire fabric makes Tuffy Slings extra flexible to resist kinking. And if you *can* kink it, you'll be able to straighten your free Tuffy Sling—or any Tuffy Sling—easily with *no material damage.*

Find Out How Tuffy gives you unbeatable service under stresses and strains of all kinds. Send for your free Tuffy Sling and convince yourself that Tuffy is the toughest in the business!

TEAR OFF AND MAIL COUPON NOW

Union Wire Rope Corporation
2278 Manchester Ave., Kansas City 26, Mo.

At no cost or obligation to me, please rush the material I have checked:

- ☐ FREE 3-Ft. Tuffy Sling!
- ☐ FREE Sling Handbook and Rigger's Manual, Featuring 12 Tuffy Factory-Fitted Types!
- ☐ Name and Address of Tuffy Distributor Nearest Me!

FIRM NAME_____

BY_____ TITLE_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

union Wire Rope corp.

Specialists in High Carbon Wire, Wire Rope and Braided Wire Fabric

For more data on advertised products, use Readers' Service Cards, last page.

A purchasing agent describes . . .

'Salesmen Who Get My Business'

Listen in on two sales talks that 'sold' him and find out why.

By JOE A. HUITT, Manager Purchasing,
Deep Rock Oil Corporation, Tulsa

JACK IS ONE of my favorite salesmen, and I'll admit he has a good chance of increasing his sales to my company. To see why I favor Jack, I'd like for you to "listen" to one of his recent sales calls.

Jack walked into my office wearing his usual big smile and said, "I'm glad you had time to see me today, Joe, because I have some pictures here that I'm sure you'll find interesting. They were taken on one of your leases near Bristow."

While making these preliminary remarks, Jack shook my hand, walked around to the side of my desk, and laid two photographs and two drawings in front of me.

Already Jack has pointed out three of the reasons for his success. First, he is busy and knows buyers are too—his first sentence acknowledged this. Second, he comes immediately to the point of his visit without being curt or unfriendly. Third, he captures the buyer's interest with useful sales aids —in this case photographs and drawings that are directly related to the subject of his call.

By these tactics Jack succeeded in a few seconds in arousing my interest and in getting my complete attention. Look at what he did next to capitalize on this good beginning.

"Here, Joe, are two pictures of installations on your Zee lease, and here are two drawings of units my company proposes to build for you for the same service. You will note in comparing these, that there are two major differences, here and here," pointing to the drawings.

In about five minutes Jack explained the significance of these two major differences. He showed me how one advantage would make maintenance easier and thus cheaper. To support his statement he went over some figures on labor-saving which he had calculated before coming to my office.

Take a look at this second phase of Jack's sales talk. He immediately told me what he wanted to sell me, and why I should want to buy it. Why is it that many salesmen either take considerable time to get to this point, or never get there at all? But Jack did, and then he demonstrated what I would gain, where the product would be useful to me, and how it compared to my existing equipment. From this point he launched into the close of his talk. Let's listen to it.

"Joe, I'd like to leave these pictures and drawings with you and also this quotation. You'll note here that I have broken down the quotation so you can determine prices for less than complete units. You may find this breakdown useful in checking our prices against other units you may have in mind. My quick calculations indicate good payout several places in your operations for these units. I know you may want to check your field men, possibly your engineers, and perhaps competitive units before committing yourself. Why don't you let me call you again—say, a week from today—to see if you need any other information?"

I agreed.

"In the meantime, if I can be of any help, just call me," Jack said. With a short farewell he was gone.

Now look at what Jack did in the last part of his call. First, he recognized that buying major equipment is generally the combined efforts of several departments in a company, and that a purchasing agent usually does not originate orders. This factor, so obvious to purchasing men, evidently is not obvious to many salesmen. For example, many times I've had salesmen wind up their presentations by asking, "How many X products do you want to order today?" Apparently, such men just don't know how most industrial purchasing is conducted.

But Jack recognized that, if I considered his proposition worthwhile, I might need to discuss it with operating and engineering people in my company before an order could be written. (Of course this is not always the case, since some items are bought regularly against standing requisitions.)

Jack recognized that other parties might be concerned, so he gave me the information I needed to verify the desirability of his product. His quotation made it easy for me to compare his unit with competitors' products. By supplying drawings, photographs and savings calculations, he made it easy for me to compare the advantages of his equipment with units we were already using. Then he determined when he should call next, offered his assistance in the meantime and left.

His closing words were geared to stimulate me to act within a reasonable but definite time. Jack's call lasted less than 15 minutes, yet it covered a complete sales presentation of above average complexity. Was Jack successful? Certainly. Within two

weeks he had an order for three units.

What can other salesmen learn from Jack's call? As I analyze Jack's call, I can see that the procedure Jack used is common to most top-notch salesmen that call on me.

- He was friendly.
- He assumed that he was calling on a busy man.
- He captured my interest.
- He got down to business quickly.
- He showed me why his message was important to my company.
- He gave me the information I needed to take further action.
- He obtained my promise to act.
- When he was through with his sales presentation, he left.

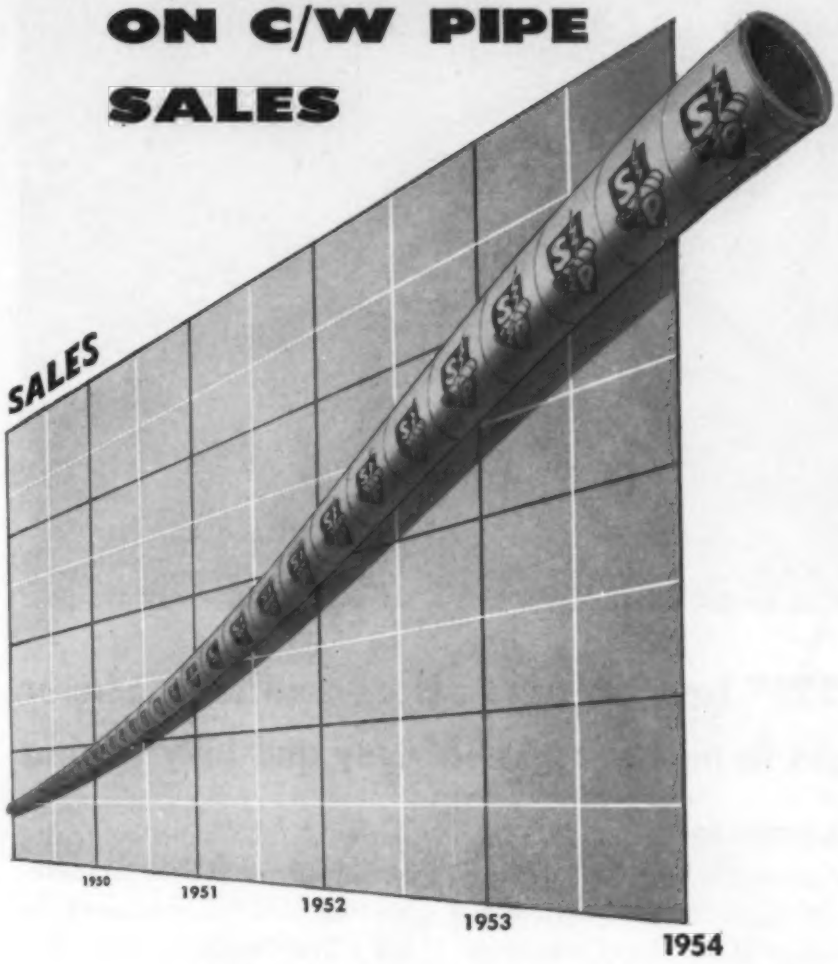
Note, too, that he was prepared for every phase of his sales talk. This is exceedingly important in saving his time and mine and in "jelling" the sale for him quicker.

Some salesmen reading this may say, "Sure, that's fine for a guy that has a big story to tell, but how about me? My job is just to keep in close contact with purchasing men and many times I don't have much to offer; I'm just making a 'routine call.'"

Some salesmen—and especially those making routine calls—seem to feel that purchasing men prefer to talk about themselves and their personal lives. But most of the purchasing men I know would rather discuss ways of saving company dollars than ways of saving strokes on the golf course. I believe that salesmen on "routine calls" underestimate their true worth. As I see it, there are two basic aids that any salesman can continually offer a buyer. They are latest information about his product and the probable importance of this information to the buying company.

Included in the first are such things as current prices and deliveries and impending shortages, as well as the way the product is used. My point is this: there is always useful informa-

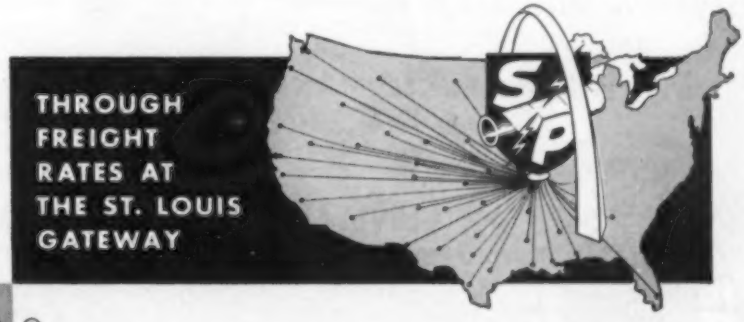
THE RIGHT SLANT ON C/W PIPE SALES



Steadily increasing sales at spi as a result of quality and service

SPI's plant includes all the machines, methods and procedures necessary to produce the finest c/w pipe. SPI's personnel are constantly aware of the value of prompt service.

For five successive years SPI has enjoyed very substantial increases in sales. Here is proof of the industry's acceptance of quality and service at SPI.



standard pipeprotection inc.®
3000 SOUTH BRENTWOOD BLVD. • ST. LOUIS 17, MISSOURI

For more data on advertised products, use Readers' Service Cards, last page.

"320" trencher pays off on smaller diameter jobs in narrow rights-of-way and hilly terrain

HARFORD BROS. of Emporium, Pa. profitably employ the speed and ruggedness of their big-capacity "320" Clevelands even on smaller diameter lines going through the rough hill country of southern New York and northern Pennsylvania.

Narrow rights-of-way and rocky digging are taken in stride by these husky "320" trenchers because of their easy maneuverability and perfect balance on their full crawler mountings.

Of course, these tough and powerful "320" pipeline trenchers capably handle the larger diameter lines, too, whenever the big jobs come along. They cut a wide variety of trench sizes from 22" to 52" wide, down to 7½' deep.

For *all* your pipeline jobs, large and small—there's a Cleveland trencher for you. They have set new standards of performance on thousands of miles of major pipeline projects throughout the world. One thing sure about Clevelands, they're . . .

Good Everywhere.

Write for the* CLEVELAND *Full-Line Bulletin or see your Local Distributor

THE CLEVELAND TRENCHER COMPANY
20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

CLEVELAND

tion a salesman can give the buyer. But to do so usually involves some "digging" by the salesman.

Here's an example that serves to show how one salesman handled what many would consider routine price information:

Early one afternoon Bill came into my office and said, *"Joe, we believe there is going to be a 10 percent price increase on Product A within the next few days. It's expected this will be an industry-wide increase. I checked your last three months' purchases from us of Product A, and I figure that the expected increase on an equal volume would cost you this much."* Bill put before me a sheet showing the calculations.

"You're normally stocking about a 60-day supply, aren't you?"

I agreed.

"In 60 days you normally buy about this many units. Since we can delay shipment for as long as 45 days, you can safely order units now and schedule delivery so you never exceed your 60-day inventory."

"Now Joe, you probably buy only part of your requirements from us, but my figures give you some idea of what you can save by ordering now before the increase goes through."

"Why don't you let me call you later when I get back to my office—say about 4:30? By then, you may have decided how much Product A you want to get on order at today's prices."

I agreed to have the information by 4:30, and Bill left.

Take another look at Bill's more or less "garden-variety" type of call. You notice that Bill was prepared to quote benefits to me just as Jack had. He recognized that additional people might have to be consulted (competitors, too). He knew about what our operations called for and what his company's experience with mine had been. He had the authority from his company to make a firm offer, and he had closed his call by stimulating me to act, setting his next time to contact me. In all this you will note he acted on a routine matter in much the same way that Jack did—brief and to the point.

Too frequently the salesman who can't show ways that his company can serve ours ends up begging for busi-

For more data on advertised products, use Readers' Service Cards, last page.

ness. This type of selling is seldom very fruitful.

Mr. H. is the "begger" type. He calls regularly. About every other call, I take time to see him, and it's the same story each time.

"Joe, why don't we get more business from you? We've got a lot of stock over there, good material. We used to do a lot more business with you. We'd like to see that happen again. Are you mad at us?"

Mr. R. has a similar story, but he is a little threatening at times. He says, "Joe, looks like there might be a shortage soon on Product W. You need plenty of W to keep operating. We want you to have a good buying history on all of our products you use. That way we can take care of you when things are short. I hear you're in the market for 50 Product B's. Don't you think you better send a big part of that order to us?"

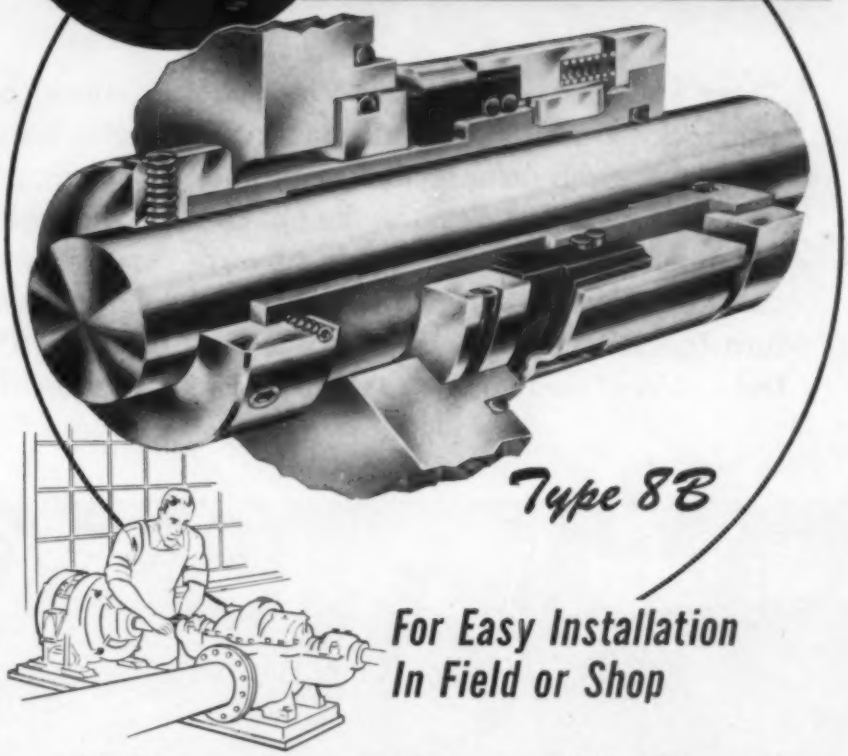
I'm sure that many purchasing men and salesmen recognize this tactic. Does the salesman really expect to generate good relations with such an approach? Remember, other salesmen with the same opportunity to threaten, don't threaten. Instead, during periods of shortages they keep right on selling in the Jack and Bill manner—continuing to serve their customers, continuing to merit their business. In competition is it any wonder that Bill and Jack do so much better than Mr. R. and Mr. H.?

Summing up the weaknesses we have noted in some salesmen, we see that many men take too long to present their story, they waste their own and the buyer's time in excessive small talk. *They take too long to get to the point.* Few come prepared to show how their product will benefit the buyer's company. Many lack the enthusiasm to stimulate the buyer to act for them. Then, lacking the ability to sell by positive means, many resort to begging or veiled threats.

I fully realize that buyers are often far from capable; however, this just increases the need for the salesman to know his job. The shortcomings we have observed here are costly to the salesman because they keep him from successfully competing with dynamic and useful salesmen like Jack and Bill, who are bound to find open doors and receptive minds wherever they call. —**The End**

JOHN CRANE

PACKAGED TYPE MECHANICAL SEALS FOR High Pressure Pipe Line Pumps



For Easy Installation In Field or Shop

Manufacturers of large centrifugal pumps and pipe line operating engineers have long been asking for an end face mechanical seal meeting these requirements: 1) heavy-duty design to handle high pressure applications; 2) single-unit packaged construction for easy installation; 3) a full range of sizes to meet individual specifications.

"John Crane" has met this need with the Type 8B hydraulically balanced seals for pressures to 1200 psi.

These seals can be quickly installed and adjusted simply by sliding the entire unit along the shaft into final position. Removal of the top casing is not necessary. This feature alone results in the saving of many man-hours of maintenance work.

Field reports and performance records point to the steadily increasing use of "John Crane" high pressure seals to eliminate problems connected with the handling of hydrocarbons, crudes, gasoline and other petroleum products.

To help you in your individual requirements, "John Crane" offers nationwide service—available without obligation from strategically located factory owned branch offices.

Write for illustrated high pressure seal bulletin.

Crane Packing Co., 1834 Cuyler Avenue, Chicago 13, Illinois.

In Canada: Crane Packing Co., Ltd., 617 Parkdale Ave., N., Hamilton, Ont.

JOHN CRANE CRANE PACKING COMPANY

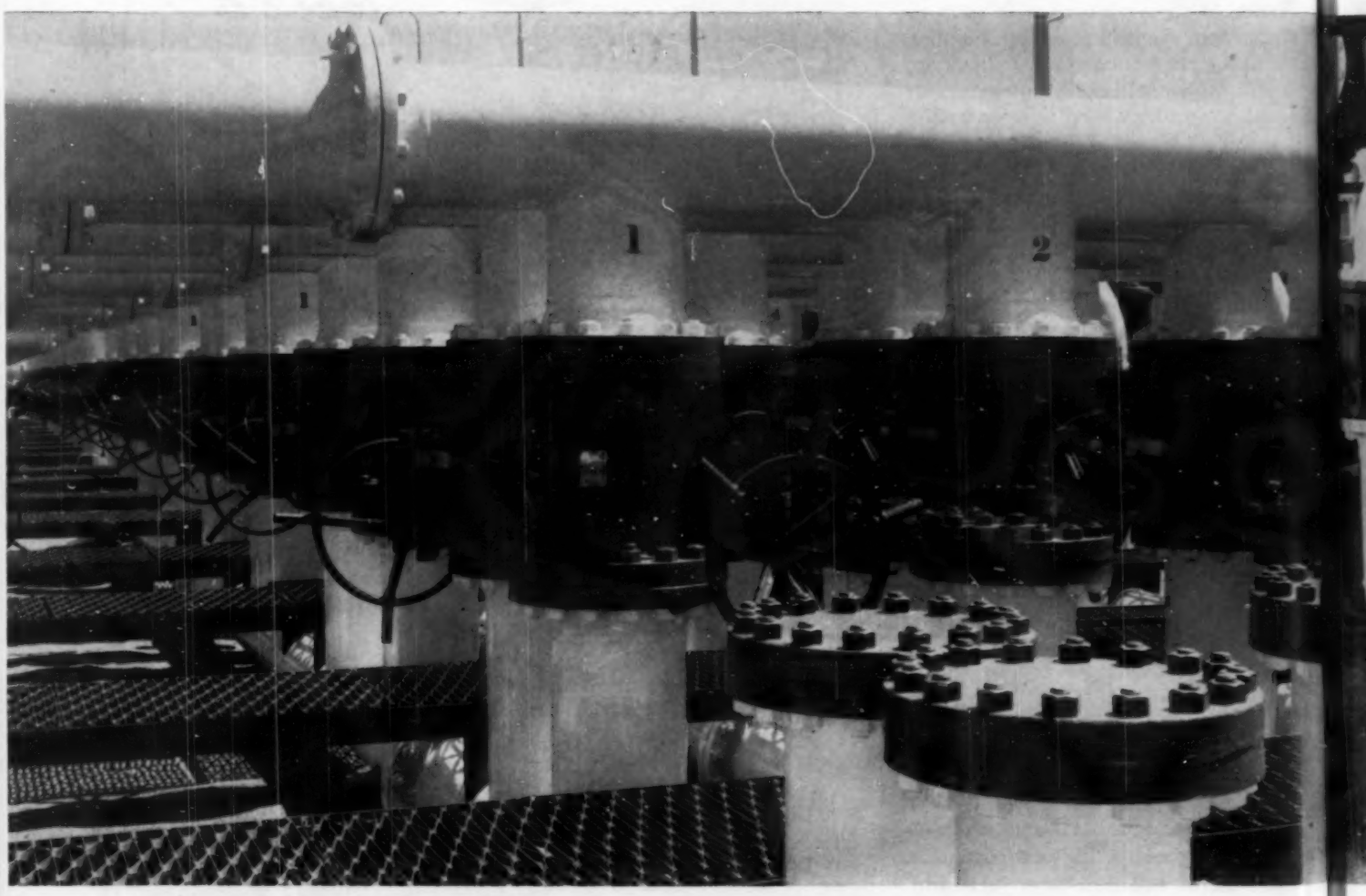
For more data on advertised products, use Readers' Service Cards, last page.

All along the

Costs down....efficiency up....with

There are three good reasons why you'll see Rockwell-Nordstrom valves all along most gas, petroleum or products pipe lines. *One:* pressurized lubricant sealing assures leakproof operation for the lightest hydrocarbons or heaviest fluids. *Two:* quarter-turn operation allows easy, positive control . . . ideal for remote power operation. *Three:* costly metal-to-metal friction on the working parts is eliminated by the tough, protective lubricant film . . . repair and replacement costs are slashed.

Valves represent one of the most important investments in any pipe line operation. All over the world, pipe line companies have found that investing in



These Rockwell-Nordstrom gear operated valves provide fast, positive, dependable control at this huge products terminal.

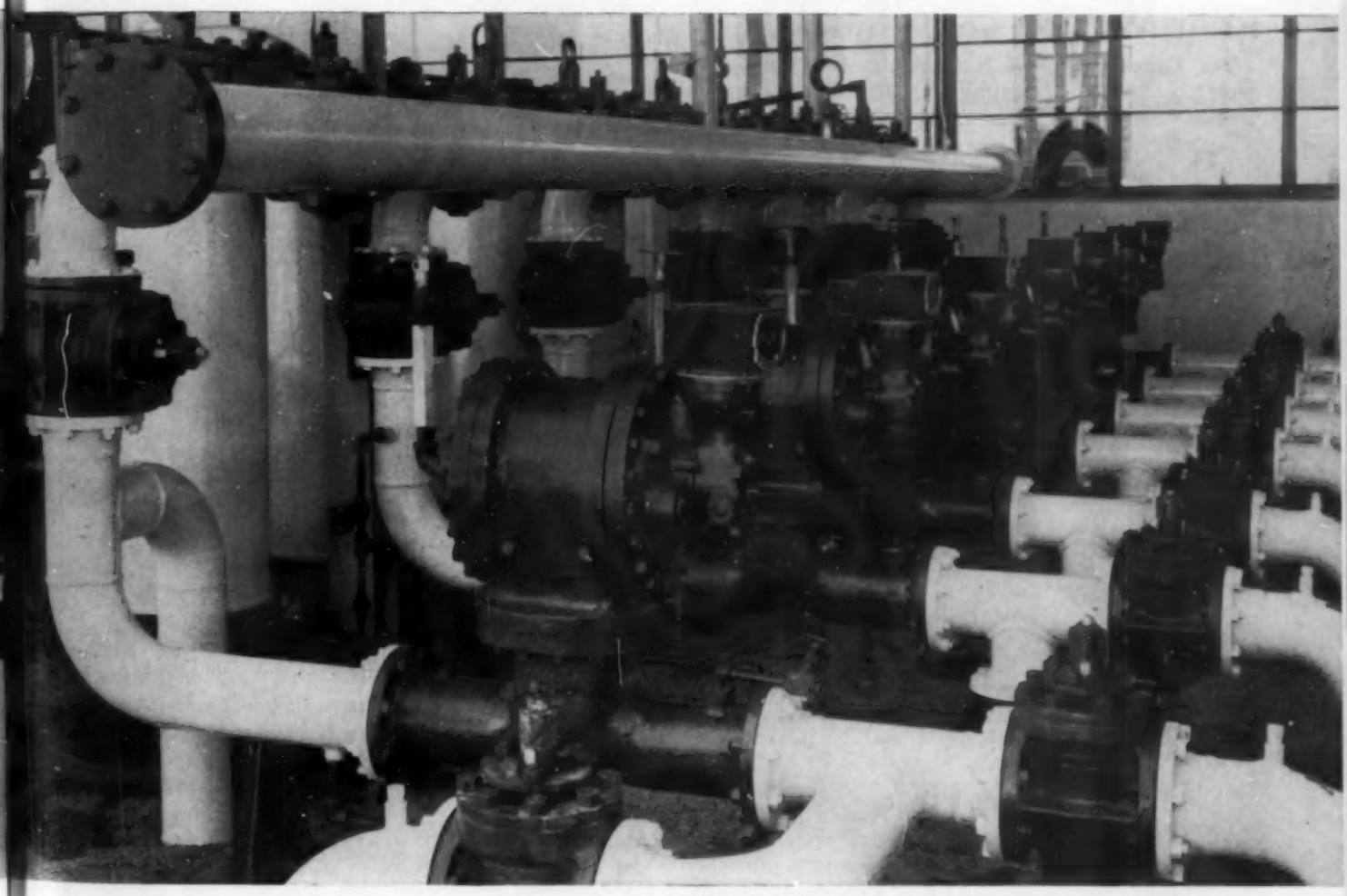
line

Rockwell-Nordstrom Valves

Rockwell-Nordstrom valves pays big dividends in greater dependability, and lower operating costs year after year.

Only with Rockwell-Nordstrom do you get a *complete* range of pressure ratings and sizes based on 40 years of lubricated plug valve leadership. Whatever your pipe line valve requirements, there is the exact Rockwell-Nordstrom valve, lubricant and operating accessory to do the job better, more dependably and at lower cost than any other valve you've ever used. Write for complete details today: Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Canadian Valve Licensee: Peacock Brothers Limited.



Rockwell Rotocycle meters and wrench operated Rockwell-Nordstrom valves make the ideal combination for accurate measurement and dependable control at this products pipe line station.

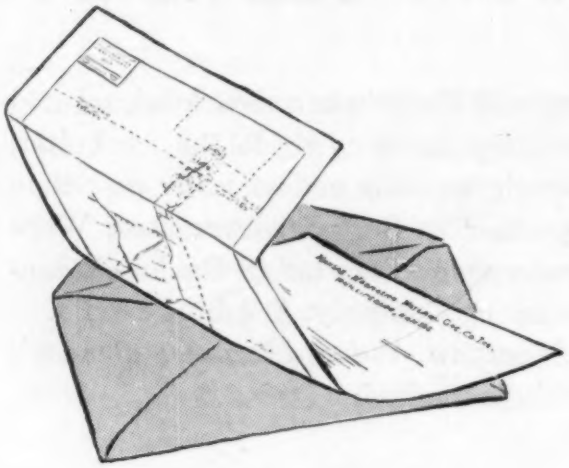
ROCKWELL-Nordstrom VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF

How to do it

PIPE LINE HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1, Texas

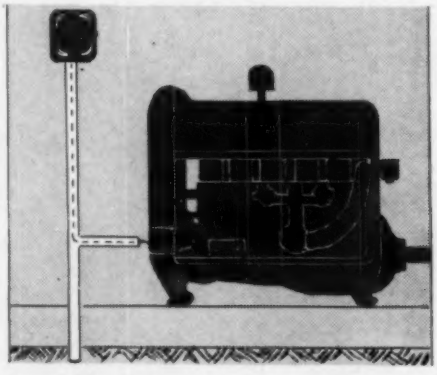


Print Map on Letterhead

The Kansas-Nebraska Natural Gas Company serves over 150 towns with natural gas, operates a dozen compressor stations and picks up gas from four states.

Because of the many loops, cross connections, and changes of line size, a system map is printed on the back of the company 8½ by 11-inch letterheads to enhance communications.

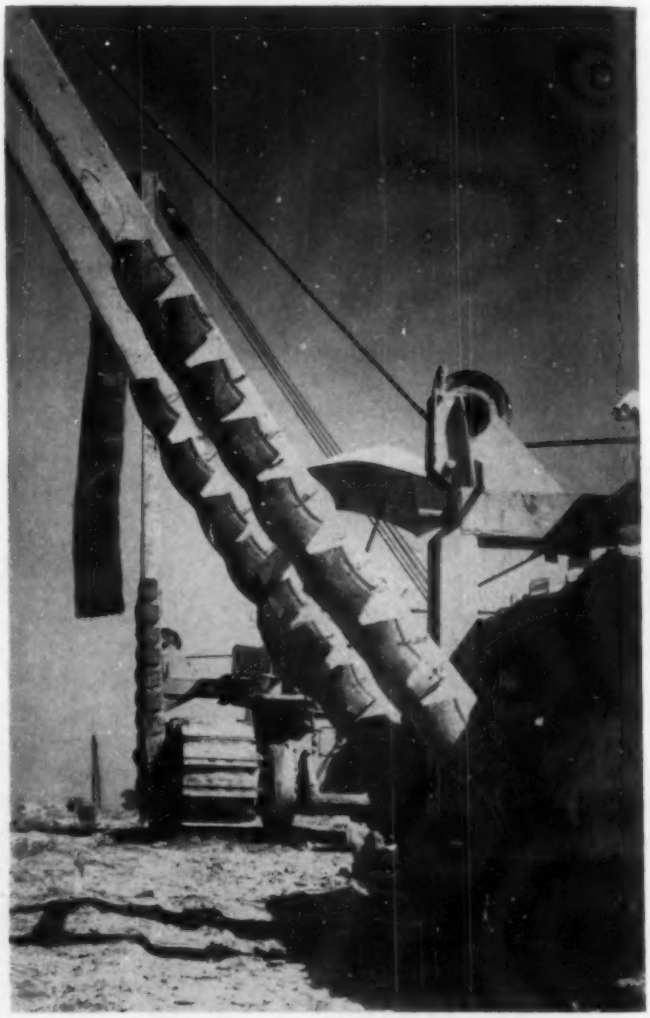
Every year the map is revised to show new lines and stations. It is drawn in ink, 20 miles to the inch, and printed by the offset process in a silvery-gray color on back of the stationery. The finished maps do not show through the bonded paper, yet they are legible and easily read.



Make Stand for Field Clock

A stand for field time clocks, used to stop gathering system pumps, can be easily made of one-inch pipe. The pipe is driven into the ground; the wire, threaded through, as shown, and tied into the clock.

This conduit arrangement reduces the hazard of breaking the wires that run from the ignition switch.



Old Tires Protect Pipes

Old tires can be used to protect pipe and pipe coating from damage by the "A"-frame on a side-boom tractor. This is highly important in a day when engineers are trying to prevent even minor scratches on pipe and are recommending almost perfect coatings. The tire serves as a sort of bumper for the pipe as it swings back against the "A"-frame.

Aside from the labor involved, there is no expense. Simply take an old tire and slice it to the tread every ten inches. Punch holes right under the tire-rims and wire the pieces to the A-frame with bailing wire. As shown here, the tread is cut through in only one place.

Lock Turnbuckle on Guy Line

Here is a simple locking device that will prevent turnbuckles holding the guys on radio towers from "backing off" and loosening under strain. It will also discourage the meddler who might loosen the turnbuckles to see if the tower would fall.

The locking device is nothing more than a wire rope threaded through the turnbuckles and the eyes in the guys in figure "8" fashion. The ends are double clamped securely as shown.

Unit Aids Undersea Work

A combination pipe rack and pipe launcher makes it easy to launch small underwater lines. The rack has a horizontal member of four-inch pipe welded to a 2½-inch socket. This fits a two-inch stand which is simply a tee welded up out of two-inch.

The support for the rollers is made of 2½-inch pipe that fits over the vertical leg. The four rollers are bearing mounted.

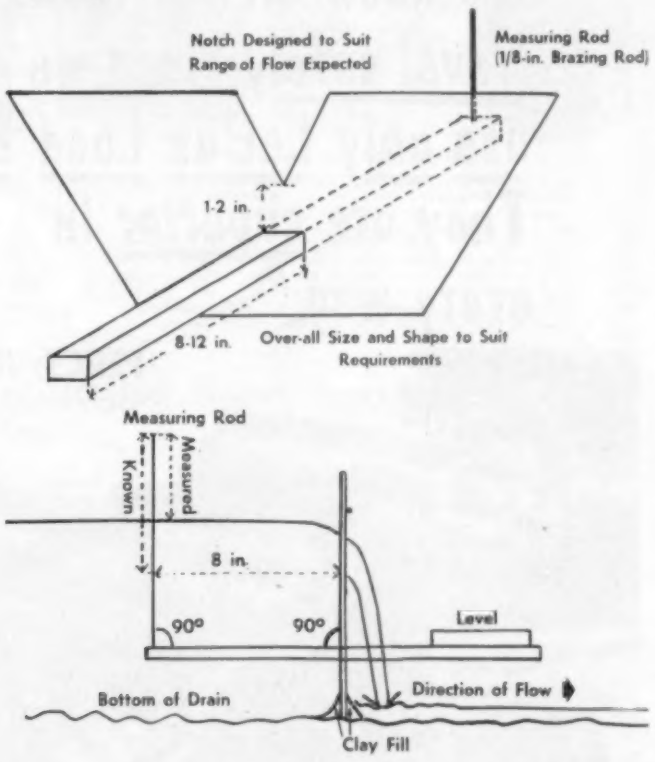
When using this unit for launching pipe, the joints of pipe from the rack are rolled over onto the rollers and the pipe can be pushed into the water.

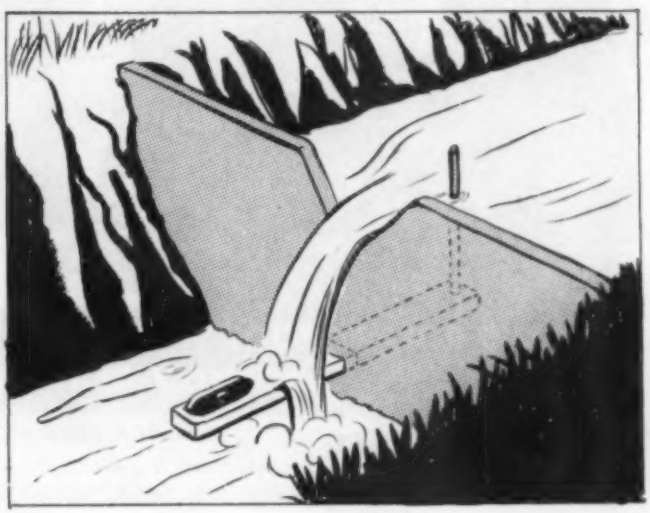
Measure Flow Rates With Weir

Get accurate and quick measurements of flow rates in drains and irregular ditches around the station by using a portable weir which can be simply and easily constructed. Recently such a device was used to make a survey of 12 different ditches on a plant site at little expense.

The external size and shape of the weir can be arranged to suit the ditches or drains to be metered. It can be semi-circular, trapesoidal, etc. The weir notch can be varied to suit the range of flow rates expected. Normally the use of a V-notch gives a greater range, particularly with small flow rates. A hydraulic handbook should be consulted on this matter.

Here is how the device works. The portable level on the rigid horizontal bar is used to insure that the baffle is vertical and the measuring rod at proper elevation. Where the head across the baffle is fairly high, it might be advisable to wedge the weir in place with bricks and seal it with clay.



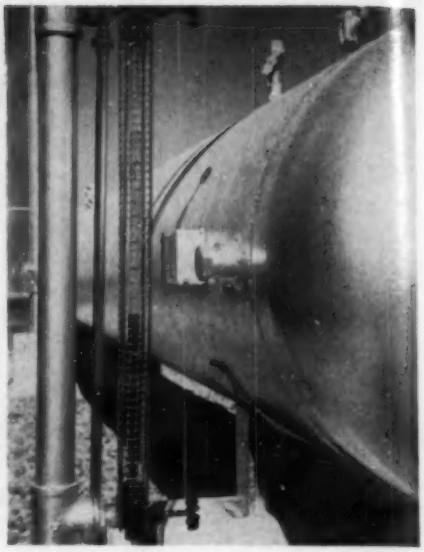


Hardware Cloth Tube Protects Gage Glasses

Take a trip through any pump station, and chances are you will find a number of gage glasses in service without any protection. These glasses may be working under any range of pressure up to 50 pounds. Some may be in service handling hazardous liquids, and fatigue and temperature changes may bring about breakage even though there is no pressure on the glass.

Three things can happen from the breakage of one of these glasses: the injury of an employe by flying glass or corrosive; a shutdown or cutback in operations while repairs are being made; or upset of good housekeeping practices by many of the liquids used.

Inexpensive protection can be provided at little cost. A length of hardware cloth can be wrapped around the glass, and the ends soldered together, making a tube around the glass. This may save a man from injury by flying glass, and if it does, it has more than paid for itself.



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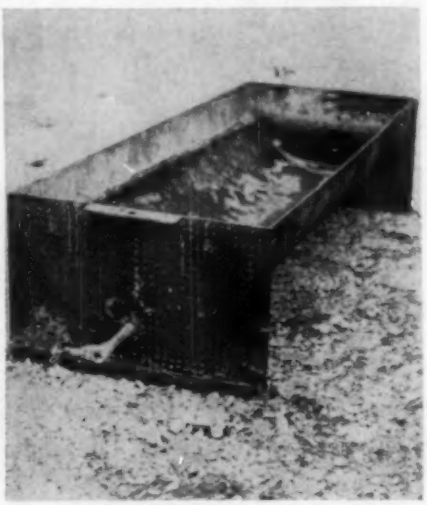
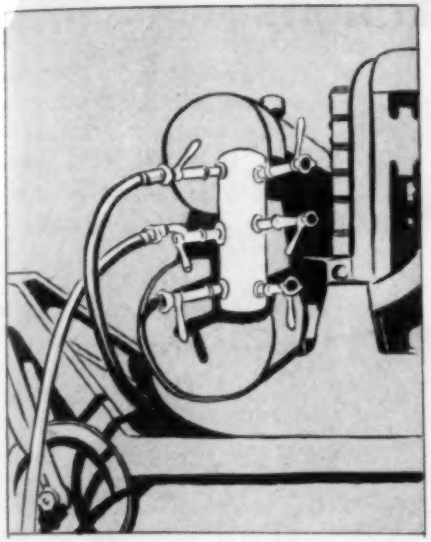


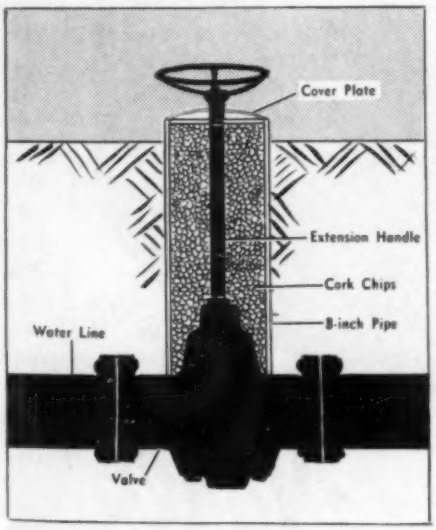
Make Solvent Vat For Engine Parts

To make a permanent vat for washing heavy engine parts removed during overhaul, pipeliners at one station welded together two sections of halved 30-inch OD pipe to make the tub. A three-foot square of one-fourth-inch floor plate was welded on each end and a length of one-inch by one-fourth-inch angle iron tacked on for footing. A three-fourth-inch gate valve mounted on a nipple in one end of the floor plate makes the drain. The whole vat is then coated with a phenolic paint to prevent chipping and to resist the strong action of the commercial solvents.



Multi Air Hose Connector Is Easy to Construct

An easily made air-hose connector for an air-compressor makes it possible to drive a large number of pneumatic tools off the same compressor. The connector is a piece of heavy-wall four-inch pipe which has been saddled with nipples of three-fourths-inch extra heavy pipe. The regular air valves and connections are made up on the three-fourths-inch nipples.



Cork Chips Prevent Valve From Freezing

By filling the annular space between the extension handle and the valve box with cork chips, one company

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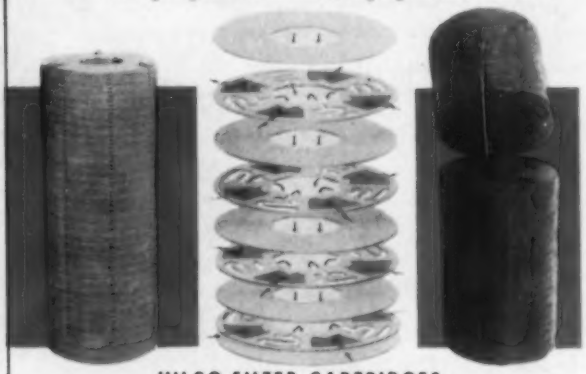

HILCO FILTER CARTRIDGES

The result of much research in the field of lubricating, fuel and industrial oil filtration, the new patented HILCO Filter Cartridges meet the need for tremendous filtering area, low pressure drop and high dirt storage capacity. Above: Fig. 1 is a new cartridge; Fig. 2 is a used cartridge (note that pockets are completely filled and the outer surface covered with solids); Fig. 3 shows the flow of oil, the dark area represents dirty oil passing into the pockets while filtered oil (white area) passes into "5" shaped section.

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You get absolute removal of sludge, acids, carbon, water and fuel dilution with a properly selected HILCO. Clean oil saves you money. Expensive maintenance is reduced, equipment shut-downs practically eliminated, lost man hours and cuts in production become a thing of the past. HILCO continuous, all electric, automatic purification keeps your oil clean and in top condition at all times. You receive the full capacity and economy of your equipment.

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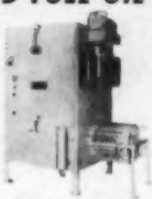

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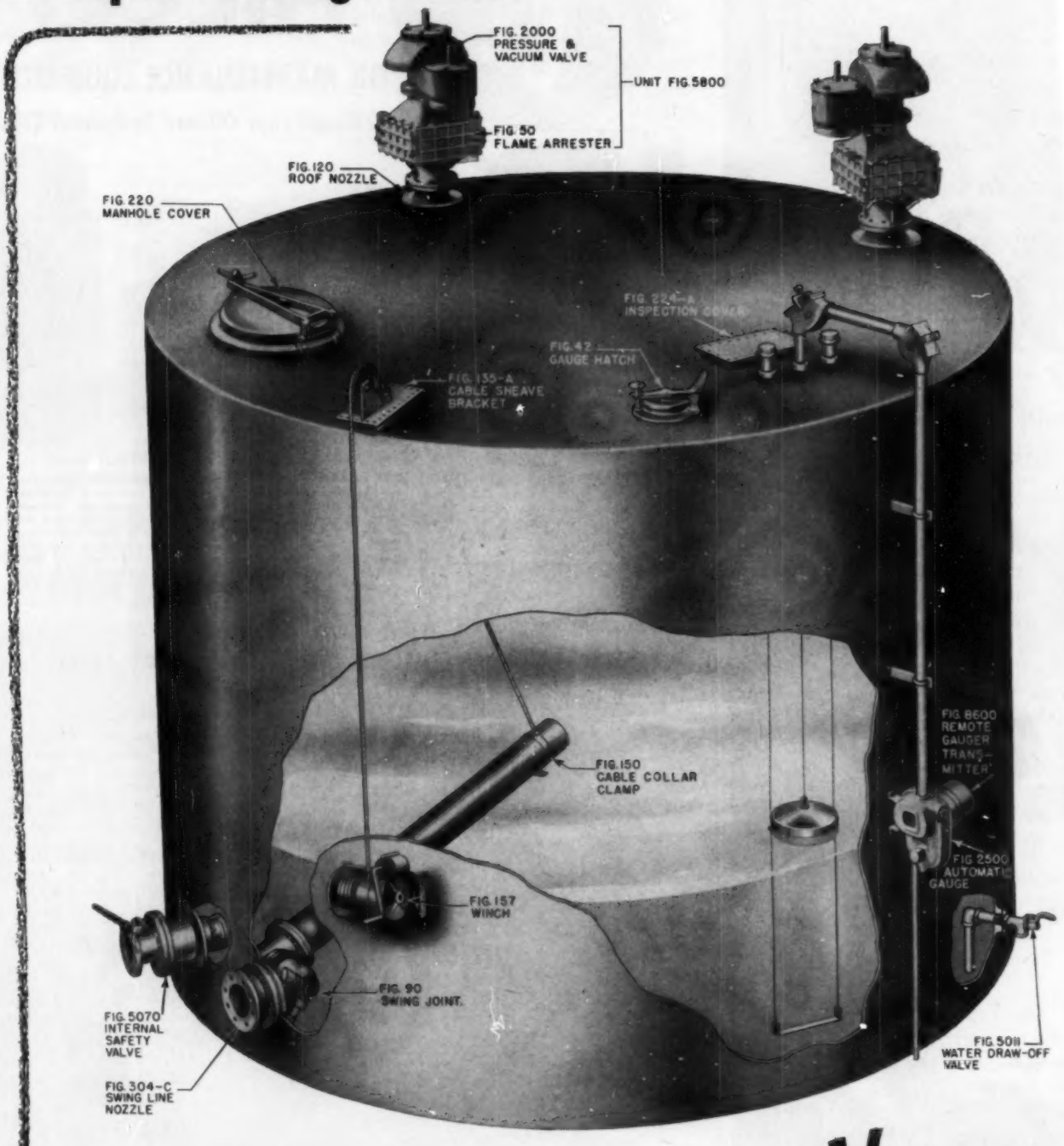
FIG. 2000 PRESSURE & VACUUM VALVE
UNIT FIG. 5800
FIG. 50 FLAME ARRESTER
FIG. 120 ROOF NOZZLE
FIG. 220 MANHOLE COVER
FIG. 224-A INSPECTION COVER
FIG. 42 GAUGE HATCH
FIG. 135-A CABLE SHEAVE BRACKET
FIG. 8600 REMOTE GAUGER TRANS-MITTER
FIG. 150 CABLE COLLAR CLAMP
FIG. 2500 AUTOMATIC GAUGE
FIG. 157 WINCH
FIG. 90 SWING JOINT
FIG. 5070 INTERNAL SAFETY VALVE
FIG. 304-C SWING LINE NOZZLE
FIG. 5011 WATER DRAW-OFF VALVE

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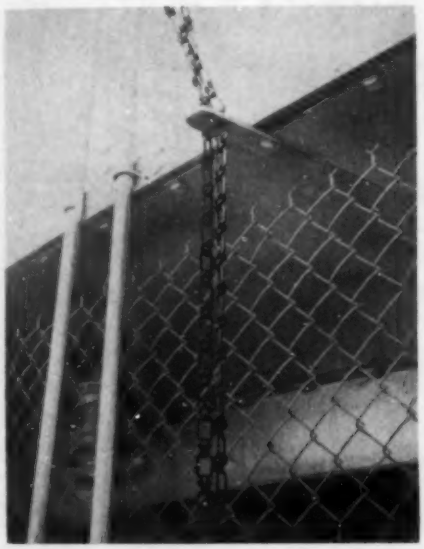
minimized the danger of water lines freezing in sub-zero weather. The water line, shown schematically here, was below the frost line and was safe from freezing except at the valve box. The latter is an eight-inch pipe running from the valve to the surface of the ground.

To eliminate this hazard, a circular cover plate, hinged for easy access, was mounted on top of the box. The space below it was filled with the light cork chips. They provide sufficient insulation for the valve, and when necessary, they are easy to remove.



Hanger Device Keeps Chains Out of Way

With the design of overhead piping becoming more popular in plant design, most valves are operated by handwheel and chain. Unless some sort of hanger is provided these chains become a nuisance, banging in the wind, etc.

The retainer pictured has served its purpose well in one East Texas booster station for many years. It is simply a strip of ¼-inch sheet steel, three inches wide and five inches long. A ½-inch hole is drilled in one end to fasten it to some supporting structure near the valve. The other end has an "L" shaped notch cut in the side. When the valve is turned to its proper operating position, the chain is then hooked into the notch. This keeps the chain out of the way and keeps the valve from turning freely under vibration.

Air Pressure System Transfer Liquid Nitrogen

Here is a system that can be used to transfer liquid nitrogen from the container in which it is received to the thermos bottle in which it is used in the laboratory. It makes use of air pressure in the vapor space above the liquid level in the nitrogen container to force the liquid upward and into the thermos.

The liquid nitrogen is used, of course, around the low temperature laboratory distillation columns which analyze for the various components in gas streams.

Two sections of one-fourth inch copper tubing are soldered to a one-fourth inch tee. One section of the tubing is bent at an angle so that the thermos can be filled by tilting slightly. The other section is cut so that it extends almost to the bottom of the big nitrogen container. A piece of three-eighth inch tubing is soldered over the one-fourth inch tubing below the tee. Over this piece of tubing is put a rubber stopper that fits the top of the nitrogen container. An air line

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from air, steam and other gas discharges

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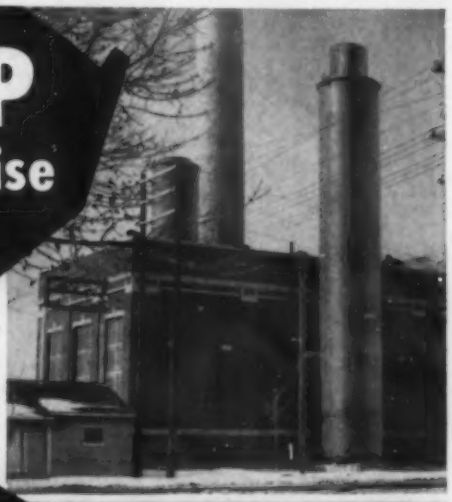
STOP Pulsation and Vibration in gas and air piping



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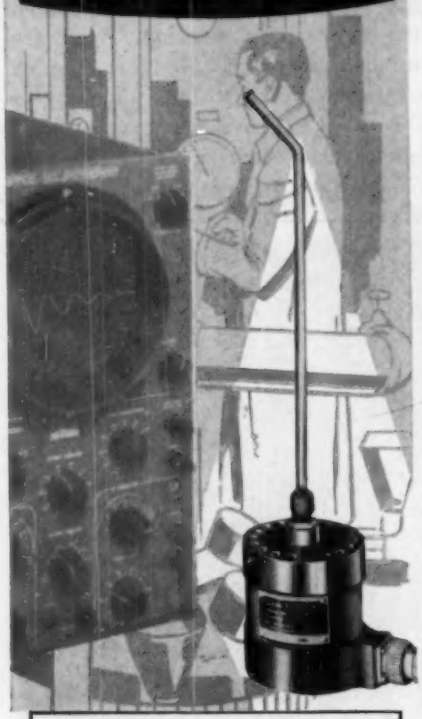

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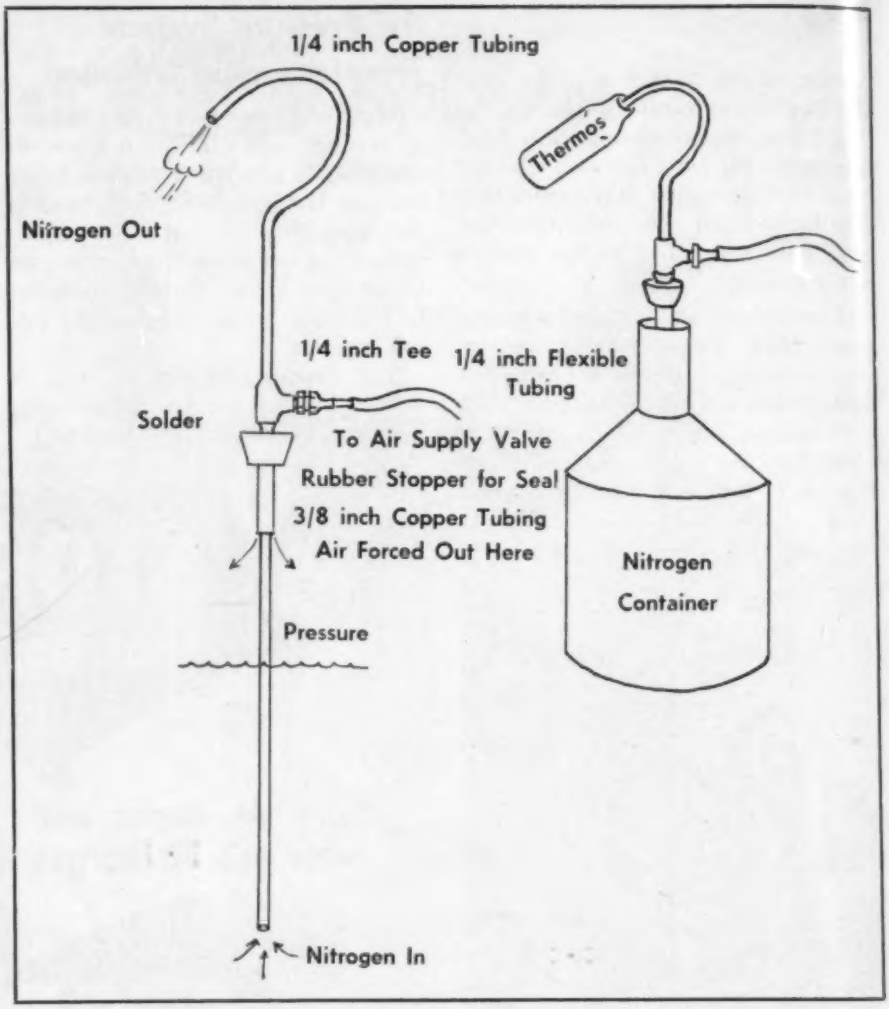

comes into the tee. Air flow is to the tee, down through the three-eighth inch tubing and out into the vapor space in the container. As the air pressure builds up in this space, it forces liquid nitrogen up into the lower end of the one-fourth inch tubing and on out the top.

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TECHNICAL DATA

TEST			FISHER TYPE 3500
INSTRUMENT PRESSURE SENSITIVITY CONTROLLING PRESSURE CHANGE NEEDED TO PRODUCE 2 LBS. TO 15 LBS. TO DIAPHRAGM			0.07 LB
STEM MOVEMENT SENSITIVITY AMOUNT STEM CHANGE TO PRODUCE 2 LBS. TO 15 LBS. TO DIAPHRAGM	½" TRAVEL		0.0037" AVE.
	2" TRAVEL		0.015" AVE.
SPEED TIME IN SECONDS FOR FULL TRAVEL	SIZE	TRAVEL	
	DD	¼"	1.2 — 1.2 SEC.
	FF	1½"	4.2 TO 4.8 SEC.
	GG	2"	7.2 SPC TO 9.6 SEC.
	HH	2"	10.5 TO 12.6 SEC.
LAG ERROR IN POSITION AT 9 LBS. CONTROLLER PRESSURE*	½" TRAVEL		0.0006" AVE.
	2" TRAVEL		0.001" AVE.
EFFECT OF VARIATIONS IN AIR SUPPLY PRESSURE	½" TRAVEL		0.1 LB. PER 5 LB. CHANGE
	2" TRAVEL		0.1 LB. PER 5 LB. CHANGE
CHARACTERISTICS CONTROLLED P VS DIAPHRAGM P			LINEAR
COMMENTS			STABLE ADJUSTMENTS ALL EASY AND SIMPLE
AIR CONSUMPTION NORMAL 9 LBS. DIAPHRAGM PRESSURE			15.0 CU FT/HR

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Canadian Gas to be Available to U. S.

As a result of a series of agreements signed by three major pipe line companies, natural gas from the Peace River area of British Columbia and Alberta will be available to U. S. markets as a supplemental supply.

The agreements call for Pacific Northwest Pipeline Corporation to take 300 million cubic feet of gas per day from Westcoast Transmission, Ltd., at the Canadian boundary near Sumas, Wash.

Of the 300 Mmcf of Canadian gas, Pacific will deliver 250 Mmcf per day to El Paso Natural Gas Corporation at a point near Mountain Home, Idaho, for transmission through a new proposed pipe line. The remaining 50 Mmcf per day would be utilized in the expansion of Pacific Northwest's markets. A total of nearly 3000 miles of pipe line, costing an estimated $350 million, will be built.

Preliminary work is going ahead on Pacific's 1500-mile main line as certificated. Construction is expected to be completed some 18 months prior to first delivery of Canadian gas.

The 30-inch, 650-mile Westcoast line, to cost approximately $120 million, is expected to be completed by late 1956. It will run from Fort St. John through Pine Pass to Prince George, Quesnel, Williams Lake, Merritt and on south, to deliver gas to the British Columbia Electric Company at Vancouver before connecting with Pacific Northwest at Sumas.

The third link of the network would be El Paso's proposed 370-mile pipe line to be built from Mountain Home, Idaho, about 40 miles southeast of Boise, to Reno, Nev. To cost $35 million, the line will be built within the next three years.

A fourth link, already certificated by the FPC, would be Colorado Interstate's 365-mile, 22-inch line from Pacific Northwest's system at Rock Springs, Wyo., to the center of their marketing area near Denver.

Since Colorado Interestate is interconnected with lines taking gas to Chicago, the agreement has the effect of providing Canadian reserves to virtually all U. S. markets.

Links with Trans Mountain Planned by Three Companies

Peace River Oil Pipeline Company, Ltd., Consolidated Gathering Systems, Ltd., and Sturgeon Pipelines Ltd. have filed applications with the Alberta Conservation Board for permission to build lines from Sturgeon Lake field to the Trans Mountain system.

Sturgeon proposes to build a 12-inch line with a full flow capacity of 60,000 b/d. Consolidated Gathering Systems plan a 198-mile line from the Sturgeon field to Edmonton. Peace River Oil Pipeline proposes to build a short 16-inch line between Little Smoky, Sturgeon and South Sturgeon fields, to join a 106-mile, 12-inch line to Edmonton on the Trans Mountain system.

NATO Announces Plans For Italian Jet Fuel Line

A $2.4 million jet fuel system is scheduled to be built in Italy this year. Bids on the proposed Montichiari-Treviso-Aviano pipe line have been opened to U. S. bidders under the international competitive bidding procedure of the North Atlantic Treaty Organization.

Standard-Vacuum To Build 90-Mile Line in Sumatra

A 90-mile pipe line to tap the new Lirik oil field in Central Sumatra is planned by Standard-Vacuum Oil Company as part of a four-year capital investment plan initiated in Indonesia.

The line, expected to be completed in 1957 or 1958, will make crude from the Lirik field commercially available for the first time.

Texas-Empire Changes Name; Plans New Oklahoma Line

Texaco-Cities Service Pipe Line Company, formerly Texas-Empire Pipe Line Company, will construct a 45-mile, eight-inch products pipe line from West Tulsa to Cushing, Okla., where it will connect with a six-inch line into Ponca City. At Ponca City, the new products system will connect with Cherokee Pipe Line for movements into Oklahoma City and Wichita, Kansas.

The corporate name, The Texas-Empire Pipe Line Company, was recently changed to Texaco-Cities Service to combine the names of the line's long-time owners. The change was made, on the eve of the line's twenty-fifth anniversary, as the second billion barrels of oil started from mid-continent fields to the Chicago refining area.

To early pipeliners, the 12-inch Texas-Empire line was one of the giants. One of the first electrically-welded cross country lines built, it had more than twice the capacity of the eight-inch lines that were then more or less standard.

Completion of the system in 1929 proved it was better economics to follow the shifting oil field plays with a pipe line than with an expensive and hard-to-move refinery. The new Cities Service refinery at East Chicago, completed in 1930, began receiving crude oil from the Texas-Empire system. Texaco's Lockport, Ill., refinery was also supplied from the new cross country line, and, later, the Indian Refining Company's Lawrenceville, Ill., refinery, after it was acquired by The Texas Company.

Texas-Empire extended its main line services to newly-discovered fields in Oklahoma and Kansas, planning its construction to provide connections with other pipe lines that extended to the high-reserve oil fields of West Texas and New Mexico. Today the system comprises almost 1900 miles of main line, with 32 pump stations.

Transco and TGT Lines Receive FPC Approval

Transcontinental Gas Pipe Line Corporation of Houston, has received FPC authorization to build 173 miles of 30 and 36-inch loop line paralleling sections of the Texas-New York system. Estimated cost is $29.7 million. This construction is part of a 361-mile expansion program planned for 1955.

At the same time, Tennessee Gas Transmission Company received authorization to build 243 miles of 24-inch line connecting Hebron storage field in Potter County, Penn. with Greenwich, Conn., and 18 miles of 24-inch connecting Hebron field with the Harrison storage field facilities in Potter County and Steuben County, N. Y. Cost is estimated at $28.7 million.

To gain access to additional gas reserves in Texas, Transcontinental has also been authorized to construct a 25-mile lateral from the main line in Calcasieu Parish, La., to connect in Cameron Parish with a 2.37-mile underwater crossing of the Sabine River to be built by Texas Gas Pipe Line Corporation, Houston. Facilities to be built by Transco will cost an estimated $1.1 million. The Texas Gas project also will cost $1.1 million approximately.

Survey Work Started On NGPL Extension

Natural Gas Pipe Line Company of America has begun survey work in preparation for construction of a 350-mile extension into Oklahoma. Application has been filed with the Federal Power Commission.

The $30 million gas line will run from Wise County, Texas, to a point near Lindsay, Okla., then northwest to Fritch.

The extension will include 90 miles of 20-inch line and approximately 260 miles of 26-inch. Plans to build 130 miles of gathering lines in Jack County and Wise County, Texas, are also included in the project.

Approval is expected to be granted in the spring.

Full Operations Begin On Arapahoe Pipe Line

Meeting planned schedules, Arapahoe Pipe Line began full operations in December. The 568-mile carrier, built to serve the Denver-Julesburg basin, western Kansas and southwestern Nebraska, runs from Merino, Colo., and Enders, Neb., on the northwest, to Humboldt, Kansas. At Arapahoe's eastern terminal, connections are made with a major pipe line trunk system moving crude into midwestern refining centers.

Main line is 18 and 20-inch pipe, and the Nebraska extension, 8-, 10- and 12-inch. Initial capacity of the line is 80,000 barrels daily.

Planning Nears Completion On Haifa-Tel Aviv Line

Plans for an approximately 70-mile pipe line from Haifa to Tel Aviv are nearing completion. To carry gasoline, kerosene and fuel oil, the six-inch line will cost an estimated $1 million plus 2.2 million Israeli pounds.

The government, the Israel National Fuel Oil Company (Delek) and other concerns, presumably British oil companies, will join in forming the operating company. Piping oil from the British-owned refineries in Haifa to Tel Aviv would considerably reduce transportation costs.

Texas-New Mexico Lets Contracts for Crude Lines

Contracts have been let by Texas-New Mexico Pipe Line Company for construction of approximately 74 miles of crude lines in eastern New Mexico and West Texas. Work began in January.

Ferguson Construction Company of Eunice, N. M., will lay 31.8 miles of eight-inch line and will take up and re-lay 5.5 miles of five-inch. This section will extend crude gathering facilities from the Maljamar Station in Eddy County to Tulk Pool in Lea County and Drickey Pool in Chaves County, N. M.

McVean and Barlow, Inc., of Odessa, Texas, will build approximately 24 miles, 9.25 miles of ten-inch and 14.25 miles of eight-inch, to run from the Roberts Ranch development area in Midland County, Texas, to Basin System's Station at Midland.

El Dorado-Kansas City Line Started for Great Lakes

Work has started on the Great Lakes Pipe Line Company's 163-mile, ten-inch pipe line from El Dorado, Kansas, to Kansas City.

Ray L. Smith & Son, Inc., of El Dorado, was awarded the contract for the 90.7-mile spread between El Dorado and Burlingame, Kansas. The remaining 72.5 miles into Kansas City will be laid by M-R Company of Wichita. Contracts include underwater crossings of the Cottonwood, Neosho and Kaw Rivers.

Contract for application of coating and stringing pipe along the right-of-way was awarded to H. C. Price Company of Bartlesville, Okla.

Pipe Line Contracts Not Let

COMPANY	Length in Miles	Diameter	Type	Origin and Terminus	Estimated Cost	Status
Alabama-Tennessee Natural Gas Co.—Florence, Ala.	25	8, 12	Gas	Alabama	$808,450	3.7 miles authorized
American Louisiana Pipe Line Co.—666 Penobscot Bldg., Detroit, Mich.	1,289	22, 30	Gas	North Tepetate, La.—Detroit, Mich.	$130 million	1,172 miles conditionally authorized
American Pipe Line Corp.—New York City (Swinerton & Walberg, Engineering)	1,425 plus 485 miles feeders & distribution lines	24, 26	Products	Beaumont, Texas area—Newark, N.J.	$170 million	Planned
Anadarko Basin Pipe Line Co.	525	24	Gas	Wise County, Texas—Texas Eastern near Memphis, Tenn.	.....	Planned
Arkansas-Louisiana Gas Co.	136	....	Gas	Arkansas, Louisiana and Texas	$9,245,166	Approved
Ar-Mex Pipe Line Co.	900	8, 12, 14	Crude	Guernsey, Wyo.—Phoenix, Ariz.	$31 million	Planned
Attock Oil Co.	60	....	Gas	Dhulian Field—Rawalpindi, West Pakistan	.....	Planned
California-Oregon Pipe Line System	103	6	Crude	Crescent City, Calif.—Medford, Ore.	$2 million	Planned
Carolina Natural Gas Corp.—701 Wilder Bldg., Charlotte, N.C.	185	2, 12	Gas	North and South Carolina	.....	Proposed
Central Hudson Gas & Electric Co.	48	12	Gas	Albany—Kingston, N.Y.	.....	Applied to FPC

Pipe Line Contracts Not Let—(Continued)

COMPANY	Length in Miles	Diameter	Type	Origin and Terminus	Estimated Cost	Status
Cherokee Pipe Line Co.	8	....	Products	Near Wichita, Kansas	.....	Planned
Cities Service Gas Co.—1st National Bank Bldg., Oklahoma City, Okla.	33	20, 26	Gas	To replace lines in Kansas and Missouri	$1,860,000	Authorized
	13	....	Gas	Labette County, Kansas	$285,000	Authorized
	15.5	16	Gas	Carter County—Garvin County, Okla.	$541,050	Authorized
City of Dalton, Ga.	39	8	Gas	To connect with Southern Natural Gas Co. line	$2,940,000	Proposed
Coast Counties Gas & Electric Co.—369 Pine St., San Francisco	40	3, 4, 8	Gas	Coast and Valley region, Calif.	.....	Planned
Colorado Interstate Gas Co.	365	22	Gas	Rock Springs, Wyo.—Denver, Colo.	$23,299,000	Authorized
	115	4, 6, 8	Gas	Denver—Julesburg Basin—Basin Cities	.....	Before FPC
Colorado Western Pipe Line Co.—Dallas	708	....	Gas	Southeastern Colorado fields—Denver, plus laterals	$30 million	Planned
	328	16, 18	Gas	LaPlata County—Pueblo, Colorado Springs and Denver	$21,600,000	Authorized
Compania del Oleoducto Buenaventura—Cali, Colombia, S.A.	90	....	Products	Buenaventura—Cali, Colombia, S.A.	$4 million	Planned
Consolidated Gathering Systems, Ltd.	198	....	Crude	Sturgeon Field—Edmonton.	.....	Planned
Dixie Pipe Line Co.	20	8	Gas	Gwinville Field, Miss.—Transcontinental Gas line	$425,000	Proposed
El Paso Natural Gas Co.—El Paso, Tex.	32.5	10	Gas	Reagan and Upton counties, Texas	$799,000	Authorized
	74	....	Gas	Texas, New Mexico and Arizona	$13,800.00	Authorized
	370	....	Gas	Mountain Home, Idaho—Reno, Nev.	$35 million	Proposed
Empresa Nacional del Petroleo	80	6	Products	Concon—Santiago, Chile	.....	Planned
Gas Service Co.—Kansas City	12	....	Gas	To connect with Cities Service Gas Co. line	$650,000	Planned
Governments of Southern Rhodesia and Portuguese South Africa	200	....	Products	Beria, Portuguese Mozambique—Umtalia, Southern Rhodesia	.....	Considered
Hope Natural Gas Co.—445 W. Main St., Clarksburg, W. Va.	33	8, 10, 12	Gas	Wyoming County, W. Va.—Buchanan County, Va.	.....	Proposed
Houston Texas Gas & Oil Co.—4604 Main St., Houston	1,542	Various	Gas	Louisiana—Florida	$148 million	Proposed
Idaho Natural Gas Co.—Goodland, Kansas	....	....	Gas	Pacific Northwest line—points in Southern Idaho	.....	Proposed
International Pipe Line Co., Inc.—227 N. Colfax Ave., Minneapolis, Minn.	132	8	Products	Wrenshall, Minn.—Minneapolis Bulk Terminal	$4,250,000	Planned
Kansas-Nebraska Natural Gas Co.—Phillipsburg, Kansas	283	6-12	Gas	Central and northeast Nebraska	$4,096,890	Some contracts let
Lateral Gas Pipe Line Co.—Cedar Rapids, Iowa	27	4	Gas	Grant—Clarinda, Iowa	$267,000	Proposed
Malco Pipe Line, Inc.	91	6	Products	Prewitt, N.M.—Albuquerque	$1,250,000	Planned
Manufacturers Light and Heat Co.—Pittsburgh	53	....	Gas	13 projects in Ohio, Pennsylvania and West Virginia	$4,099,250	Authorized
Mayflower Pipe Line Co.-(Pine Tree Natural Gas Co.) —70 Pine St., New York, N.Y.	200	....	Products	New Jersey refining area—New England	.....	Planned
Michigan Consolidated Gas Co.—415 Clifford, Detroit	25.5	12	Gas	Sparta—Muskegon, Mich.	$13 million	Proposed
Michigan-Wisconsin Pipe Line Co.—500 Griswold, Detroit	252	4-24	Gas	Wisconsin	$11 million	Proposed
Missouri Central Gas Co.	25	6	Gas	Moberly—Macon, Mo.	.....	Proposed
Missouri Public Service Co.—Warrensburg, Mo.	136.4	8-10	Gas	New Franklin, Mo.—Grundy County, plus laterals	$5 million	Proposed
Montana-Dakota Utilities Co.—Minneapolis	56	2, 4, 6	Gas	Hettinger and Stark counties, N.D.	$728,854	Authorized
Moore-Stoner Co.	200	6	Products	Glendive, Mont.—Minot, N.D.	$2,000,000	Planned
NATO	1920	4-10	Products	To serve military bases in Western Europe	.....	Foster-Wheeler Prime Contractors
Natural Gas Pipe Line Co. of America—20 N. Wacker Dr., Chicago	479	20, 26	Gas	Wise County, Texas—Fritch	$32,070,000	Before FPC
Natural Gas Producers, Inc.—Colorado Springs	61.8	12	Gas	Yenter Pool—Denver	$1,374,000	Planned
Nebraska Pipe Line Co.	220	6	Products	Cheyenne, Wyo.—North Platte, Neb.	$4 million	ODM certificate granted
New River Gas Co.	50	....	Gas	Summers-Monroe Counties, W. Va. and Narrows and Dublin, W. Va.	.....	Planned
NNCW Pipe Pine Co.—Dallas, Texas	127	8, 10	Crude	Clareton Field—Casper, Wyo.	$3.6 million	Planned
North Dakota Natural Gas Co.—St. Paul, Minn.	500	6, 10, 12	Gas	Tioga-Minot, Fessenden, Devils Lake and Fargo, N.D., plus 6" feeder lines	$10.8 million	Proposed
Northern Indiana Fuel & Light Co.—Auburn, Ind.	35	10	Gas	Edgerton—Auburn, Ind.	$876,814	Planned
Northern Natural Gas Co.—2223 Dodge St., Omaha	167	24	Gas	Farmington, Minn. to Duluth, Minn. and Superior, Wis.	$12 million	Before FPC
	329	2, 12	Gas	Sioux Falls to Aberdeen, S.D.	$6,661,100	Proposed
	310	24	Gas	Tioga to Fargo, N.D.	$18,494,000	Planned
	....	....	Gas	To interconnect with Natural Gas Pipe Line	$244,000	Planned
	403	24, 30	Gas	Emerson, Manitoba, Canada—Farmington, Minn.	$32,813,000	Before FPC
Northwestern Utilities, Ltd.—10124-104th St., Edmonton, Alberta, Canada	42	12	Gas	Bonnie Glen—Edmonton, Alberta	$1.4 million	Proposed
Pacific Northwest Pipe Line Corp.—M&M Bldg., Houston	1466 plus 443	Various	Gas	San Juan Basin—Pacific Northwestern states	$160 million	Approved
Petroargentina	370	16	Crude	Newguen—Bahia Blanca, Argentina	$40 million	Planned
Petroleos Mexicanos—Ave. Juarez, 94, Mexico City	440	20	Gas	Brazil—Tampico—Poza Rica, Mexico	.....	Planned
	260	6, 8	Products	Lagos, Mexico—Guadalajara, Aguascalientes and Salamanca	.....	Planned
	145	12	Crude	18 de Marzo Field—Monterrey, Mexico	.....	Considered
	72	12	Crude	Poza Rica—Atzacapotzalco, Mexico	.....	Proposed
Phillips Petroleum Co.—Bartlesville	54	6	Products	Goldsmith—Borger, Texas	.....	Planned
Pine Tree Natural Gas Co.	204	8, 10	Gas	Boston area—Bangor, Maine	.....	Planned
Progress Pacific Pipe Line Co.—530 W. 6th St., Los Angeles	1100	24	Crude	Odessa, Texas—Los Angeles Harbor	.....	Planned
Santos Jundiai Railway Co.—Brazil	....	8, 14, 22	Crude & Products	Expansion of Santos—Sao Paulo system	$5 million	Planned
Shenandoah Gas Co.—Lynchburg, Va.	40	3, 4, 8	Gas	Virginia Gas Transmission Co. System—Virginia and West Virginia towns	$1,470,000	Authorized
Sioux Oil Co.	50	....	Products	Newcastle, Wyo.—Rapid City, N.D.	$1 million	Planned
Sturgeon Pipe Line, Ltd.	100	12	.....	Sturgeon Lake Field—Trans-Mountain system	$6,500,000	Planned
Sunflower Pipe Line Co.—Tulsa, Okla.	265	3-6	Products	Kearny, Grant and Haskel Counties, Kansas—Wichita, Kansas	$3.5 million	Authorized
Tennessee Gas Transmission Co.—Box 2511, Houston	50	10	Gas	Nueces County, Texas	.....	Proposed
	243	24	Gas	Hebron Storage Field, Pa.—Greenwich, Conn.	$28,700,000	Authorized
Texaco-Cities Service Pipe Line Co.	45	8	Products	West Tulsa—Cushing, Okla.	.....	Planned
Texas Eastern Transmission Corp.—Texas Eastern Bldg., Shreveport, La.	481	16, 24, 26	Products	Reconvert "Little Big Inch" line and construct 382 miles of additional line	$7,114,000	Proposed
Texas Gas Pipe Line Corp—Houston, Texas	3.5	12	Gas	Sabine River crossing to join Transcontinental Gas Pipe Line	$1,084,329	Authorized
Texas Gas Transmission Co.—416 W. 3rd St., Owensboro, Ky.	81	20, 26	Gas	Looping portion of Louisiana-Tennessee Line plus 100 miles smaller lines in Southern Indiana	$17.5 million	Proposed
Trans-Canada Pipe Line, Ltd.—Calgary, Alberta	2240	30, 36	Gas	Alberta—Eastern Canada	$297 million	Approved
Transcontinental Gas Pipe Line Corp.—3100 Travis St., Houston	....	....	Gas	Connecting facilities with Texas Eastern Penn-Jersey in Pennsylvania and New Jersey	$131,628	Authorized
	361.5	30, 36	Gas	Paralleling portions of Texas-New York line	$48,205,000	173 miles authorized plus 58 miles of 12 and 16-inch line)
	25	12	Gas	Cameron and Calcasieu parishes, La.	$1,076,000	Authorized
Triangle Pipe Line Co.	560	12	Products	Arkansas City, Ark.—Covington, Ky.	$24.5 million	Proposed
Union Oil Co. of Canada, Ltd.—Chatham, Ontario	180	24	Gas	Dawn Gas Field to Lamberton County to deliver gas to Dominion Gas Co.	.....	Planned
United Fuel Gas Co.	13	12, 20	.....	West Virginia	.....	Before FPC
U. S. Navy	600	10	Products	Under study to supply naval and air bases in Spain	$16 million	Planned
U. S. Navy	450	8	Gas	Gubik Field—Fairbanks, Alaska	$20 million	Planned
Utah Natural Gas Co.	40	16	Gas	Orem—Salt Lake City, Utah	.....	Planned
Virginia Natural Gas Co.	153	....	Gas	Buckingham—Richmond and Portsmouth, Va.	.....	Planned
West Coast Pipe Line Co.—Mercantile Bank Bldg., Dallas	960	24, 26	Crude	Wink, Texas—Norwalk, Calif.	$106 million	Planned
West Coast Transmission, Ltd.	650	30	Gas	Peace River Fields—Sumas, N.D.	$120 million	Proposed
Winnipeg and Central Gas Co.	450	4-8	Products	Tioga, N.D.—Winnipeg, Canada	$20 million	Planned
Wyoming Gas Products Corp.	....	....	Gas	Gathering system in Weston County, Wyo. to feed gasoline plant	.....	Planned
Yacimientos Petroliferos Fiscales Bolivianos	170	4	Crude	Bermejo—Tupinza, Bolivia	.....	Planned

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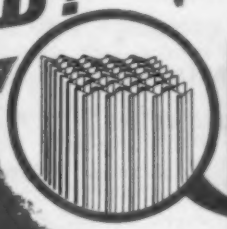

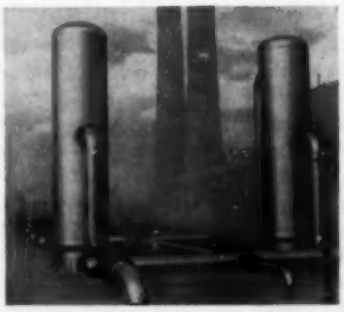

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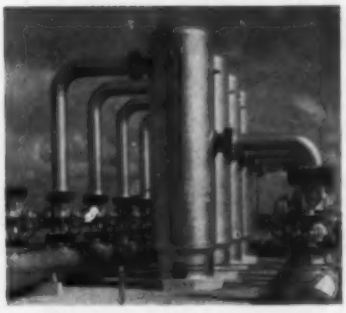

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PIPE LINE INDUSTRY'S VIEWS OF THE NEWS

HEADLINES OF THE MONTH

• Industry's educational campaign aimed at gas-consuming Public . . . • TET airs plans for financing Little Inch . . . • Government begins census of oil and gas firms . . . • Imports debate rages . . . • Texas compensation laws may be changed.

Public Told of Gas Case

Not a single bill had been introduced in the new Congress late last month to overturn the Supreme Court mandate that the Federal Power Commission must regulate the price of natural gas sold in interstate commerce.

Numerous congressman were poised for such action but apparently were awaiting a go-ahead from strategists. They won't reveal plans, PIPE LINE INDUSTRY was told, until blocs in both Senate and House feel they can win. At the moment they were awaiting public reaction to a publicity campaign to win consumer support for bills that would free gas producers from FPC control.

Ads appealing for consumer support are appearing in newspapers throughout gas served areas. Television and radio also will be resorted to. Spearheading the drive is the Natural Gas and Oil Resources Committee, industry group created last fall. One of the first ads to appear was paid for by the District of Columbia Natural Gas and Oil Resources Committee. Published in Washington newspapers, it defined the FPC regulations, told how they affect gas bills, warned of the consequences, and asked the readers to "reach your own conclusions, and make those conclusions known to your friends and neighbors." All, in turn, would write their congressmen.

Coincident with this, James R. Durfee, chairman of the Wisconsin Public Service Commission, charged Phillips Petroleum Company with waging a "gigantic propaganda campaign" to get Congress to bypass the Supreme Court's price-fixing decree. Phillips sells gas to the Michigan-Wisconsin Pipeline Company.

Reps. Frank Ikard (D-Tex.) and Oren Harris (D-Ark.) have served notice in floor speeches that they will offer bills to take the FPC out of the price-policing field. Harris is a member of the House Commerce Committee which will consider such measures. Two new democratic members of the committee are Martin Dies and Walter Rogers, both Texans and certain supporters of the Ikard-Harris bills. The new Senate Commerce Committee has several pro-industry members, including Price Daniel of Texas and A. S. (Mike) Monroney of Oklahoma. Senate Democratic Leader Lyndon B. Johnson of Texas, who was on this committee, shifted to the finance committee where he will be in a strategic position to thwart moves to cut the percentage depletion allowance.

FPC, which didn't want the price-fixing job in the first place, was still trying to evolve rules that will meet complaints from producers. It twice has changed the rules to simplify its price-control requirements and is now weighing prospective changes based on hearings, Jan. 11-13, on principles and methods to be applied in fixing rates to be charged independent producers for gas sold in interstate commerce. Witnesses included producers, pipeliners, distributors, and local and state commissions.

There were many differences of opinion, some heated. The producers generally urged the commission to accept, as fair and reasonable, contracts made at arms-length bargaining.

Pipe line spokesmen were far apart. Some supported the producers. Others suggested modified field prices for future contracts. Others urged the commission to delay action until Congress has its say.

Distributors, for the most part, wanted modification of the fair field price for new contracts. They also would continue the FPC's June 7 price freeze on existing contracts unless producers could justify increases.

Spokesmen for the cities advocated use of the "original cost formula."

State commissions urged a sweeping FPC investigation of the whole matter. Wisconsin, however, urged the original cost formula. Nearly everybody except the producers was firmly against favored nation or escalation clauses.

FPC General Counsel Willard E. Gatchell, who has made conflicting statements on the commission's position on these clauses, was on hand to cite court cases bearing on FPC powers. In December he said unequivocally that after May 1, escalator and favored nation clauses would not be worth the paper they were written on—that the commission would NOT recognize them. A few weeks later he modified this. He said the commission retains "complete freedom" to decide its future position. He said that between now and May 1, when commission order 174-B takes effect, the FPC is free either to accept or reject the clauses even though they are expressly forbidden by 174-B after May 1.

Meantime, the commission has ordered 14 independent producers in the Clayton and La Gloria fields in Texas to show cause on Feb. 7 why they must not obtain FPC permission to terminate gas service, under an escape clause, to the Texas-Illinois Natural Gas Pipeline Company, Chicago. Gatchell says the commission does not recognize escape clauses under the Natural Gas Act. The producers were directed to show cause why they should not be classed as natural gas companies under the Act.

TET Airs Little Inch Plans

The Texas Eastern Transmission Corporation submitted to the Federal Power Commission a financing plan for proposed reconversion of a major portion of the Little Inch line from a natural gas to a petroleum products carrier.

Under the plan, eight insurance companies agreed to purchase $40 million worth of new 3¾ percent first mortgage bonds which would finance part of the $85 million program now before the FPC for approval.

August Belmont, vice president of Dillon Reed and Company, Inc., New York investment bankers, testified the company would meet no difficulties in marketing junior securities to finance the entire program.

The plan was presented by R. Clyde Hargrove, Texas Eastern assistant general counsel. The insurance companies are Aetna Life, Massachusetts Mutual, Metropolitan Life, New York Life, Northwestern Mutual, Penn Mutual, Sun Life Assurance Company of Canada, and Travelers.

Hearings on the project began in mid-December, with opposition coming from Mississippi and Ohio river barge operators, the American Pipeline Company, some

coal interests, and John L. Lewis' United Mine Workers (Ind.).

Indications are the application will be approved if Texas Eastern can prove it will continue to supply gas to its gas customers.

Industry Census Begun

Industry firms are receiving a government questionnaire aimed at securing data for the first nationwide business census in 15 years.

The census is covering 3,316,000 business firms, among them 35,000 in the mineral industries, primarily oil and gas.

There has been no census in the oil and mining industries since 1939. Business and manufacturers were brought up to date in 1947-48. In that 15-year span, the national economy has burgeoned so fast that past census figures are out of date.

Some of the questions to be asked are: Identification of your oil and gas operation, and nature of operations; company affiliations and ownership; employment and payrolls; man-hours of production, development and related workers, by type of work; cost of supplies, fuels, electric energy, contract work, and machinery; water use during 1954; horsepower rating of power equipment at end of the year; capital expenditures; cost of drilling; crude petroleum and natural gas extraction, and products and services.

The Bureau of Census of the Department of Commerce is conducting the census in cooperation with the Bureau of Mines so there will be no duplication. Product inquiries will vary by kind of industry, with the queries tailored to fit a specified industry or several closely related.

All recipients of questionnaires are being asked to mail their answers within 30 days. "A good job cannot be done without the cooperation of all businessmen who are called upon to report," the Census Bureau said. "The value of the censuses depends largely upon prompt and accurate reporting by business, and speedy compilation and publication of the results. Business men need facts in developing markets, determining production schedules, arranging distribution through efficient channels, and making the many management decisions that are required to meet the ever-changing industrial and consumer demand picture. Many a business man relies upon the industrial and trade census reports for reference data in preparing production and sales programs."

The Bureau stressed that individual reports will be confidential. The data in them will merely be summarized to throw light on an industry or business as a whole. A host of businesses will not be covered by the censuses. These include transportation, communication, public utilities, real estate, finance, insurance, radio, television and law.

Imports Argued at Capitol

The dispute over imports is hourly becoming more vitriolic at the Nation's Capitol.

- Eight bills to put imports on a quota basis have been introduced in the House.
- President Eisenhower, who opposes quotas, purposely omitted mention of oil in his reciprocal trade message.
- The National Coal Association wrote every member of Congress demanding remedial legislation.
- The Bureau of Mines entered the controversy with a warning that domestic crude production last year was down 2 percent and stocks were reduced by 14 million barrels.
- Russell B. Brown, general counsel of the Independent Petroleum Association of America, declared that for the four-week period ending January 7 imports averaged an all-time high of 1,308,900 barrels a day —15.2 percent of the total U. S. supply. Brown charged that "the importers have discredited business statesmanship." He said, in effect, that they had gone back on their implicit pledge to reduce imports through voluntary action.

Brown disclosed that representatives of state and local domestic producers would meet in Washington late in January "to evolve the domestic industry's basic pattern of activity in 1955 to restrict imports to a reasonable level." He said this meeting would be "a further step to effectuate action" authorized by the resolution adopted at a December meeting of independent producers at Fort Worth.

Brown also took note of President Eisenhower's omission but took some comfort in the chief executive's statement in his State of the Union message on conservation of natural resources. He said this may be significant in relation to imports.

The House Ways and Means Committee has already held hearings on bills to carry out Eisenhower's reciprocal trade request—a three-year extension of the present law with new authority to cut tariffs a total of 15 percent over the three-year span. It plans to take up the import problem separately later. Brown has requested permission for IPAA and other domestic producer organizations to testify. So has the National Coal Association. Soft coal production was down 14 percent last year, due mostly to residual fuel oil imports and natural gas competition.

The President's Cabinet Fuels Resources Committee will discuss the imports problem in its impending report, but there is some doubt it will make flat recommendations. Quota bills were introduced by Reps. Kelley (Penn.), Saylor (Penn.), Van Zandt (Penn.), Fenton (Penn.), Byrd (W.Va.), Kee (W.Va.), Siler (Ky.), and Morgan (Penn.). These are only forerunners. The NCA claims it has 130 House members and 22 senators lined up to support the measures.

While the outlook in Congress is doubtful, shifts of members on strategic committees have increased the likelihood of some action. Two Texans, Martin Dies and Walter Rogers, both Democrats, have been assigned to the House Commerce Committee which probably will consider quota legislation. Other members include Oren Harris (D-Ark.), William T. Granahan (D-Penn.), Kenneth A. Roberts, Harley O. Staggers (D-W.Va.), and John Bell Williams (D-Miss.).

The comparable Senate committee includes Sens. Price Daniel (D-Tex.), A. S. Mike Monroney (D-Okla.), George A. Smathers (D-Fla.), John W. Bricker (R-O.), Andrew F. Schoeppel (R-Kan.), John Marshall Butler (R-Md.), and James H. Duff (R-Penn.).

Ask Compensation Changes

Bills which would correct abuses in the Texas compensation laws and ultimately result in more reasonable insurance rates for the oil industry were introduced in both houses of the Legislature last month by Sen. Searcy Bracewell and Rep. Garth Bates, both of Houston.

Substantially the same provisions were made in both bills, according to an analysis of the proposed legislation made for PIPE LINE INDUSTRY by Joseph M. Shelton of the Dallas law firm of Weatherred, Geary & Shelton.

With a single notable omission, the proposals are markedly similar to those which failed to come up for consideration and action in the 1953 legislative session despite the backing of approximately 100,000 Texas employers, including hundreds of producers and drilling contractors. Not included in the current bills is a proposal which would prevent appeal to the district courts from the findings of the Industrial Accident Board, except on points of law. This provision was strongly attacked as an attempt to abridge trial by jury and was a prime cause for failure of the 1953 proposals.

Most important stipulation in the new bills would overturn judicial decisions handed down in the Holmes and Glenn cases. The Holmes decision, applying to

specific injuries, and the Glenn decision, make it possible for a highly paid worker to receive as much compensation for a 35 percent leg disability, for example, as for the loss of the entire leg. The legislation now proposed would calculate the benefits for partial disabilities based on the percentage of maximum benefits, rather than the wage rate.

Another major provision aims at reducing the temptation for attorneys to appeal compensation cases for the greater fees to be gained in district courts. The new bills would make no change in the law allowing attorneys 15 percent of the first $1000 recovered and 10 percent thereafter for representing a claimant before the Industrial Accident Board. However, if the attorney elected to appeal to the district court, where he is now allowed 33⅓ percent of his client's award, he would be limited to 25 percent of the amount recovered or a total fee of $2000, depending on which is the lesser.

A third proviso would require that a compromise or settlement of a compensation claim must specify the weekly rate of benefits allowed and the number of weeks the settlement is intended to cover. One objective is to prevent an employe who has received a lump sum award for an injury from returning to work, suffering another injury, and collecting a second benefit to sustain him for a period of time supposedly covered by the first award.

A fourth major clause would protect employers in cases where an employe aggravates an old injury. For example, if an employe is suffering from a 50 percent pre-existing disability and then aggravates that injury to an extent justifying an additional 20 percent disability, the present employer would not, as now, have to pay for the entire 70 percent disability. This clause is expected to make handicapped job seekers more acceptable to employers who now have cause to fear payment of total disability loss.

A fifth provision would revise the law on compensation claims arising from travel, which are particularly burdensome to the oil industry. The new bills propose that the test of a travel case must be the prime purpose for a trip. If, for example, an employe departing on a pleasure trip is requested by his employer to attend to some business detail while on the journey, the employe would not be entitled to compensation in case of an accident. But if the employe is on a business mission and the pleasure aspect is incidental to the trip, any injury would be compensable.

A sixth stipulation would bring about long-sought self insurance for financially responsible employers.

In brief . . .

Plans for proration legislation in Colorado and Wyoming have been dropped for this year by the Rocky Mountain Oil and Gas Association. The association will continue to push proration proposals in Nebraska.

Agriculture Department figures released last month show that 2654 cooperative associations did a gross oil business of $436,274,000 from July 1, 1952, through June 30, 1953. This was a $14.7 million gain over fiscal 1952.

Changes in oil and gas lease provisions for federal lands include an increase in acreage limitation from 15,360 acres to 46,080 acres (100,000 in Alaska); increased limitation on options from 100,000 acres to 200,000; length of options from two years to three years; and automatic termination of leases upon failure to pay rentals.

U. S. motor vehicle registrations increased about 1.8 million in 1954, bringing the total to more than 58 million, it was estimated by the Bureau of Public Roads. Mileage traveled increased 3.3 percent. A total of 20,989 miles of roads were built during the fiscal year ended June 30, a decrease of 2637 from the previous year, but at a cost increase of $23 million.

New application forms for oil and gas leases acquired by the U. S. have been made available to land offices of the Bureau of Land Management. They must be used on and after Jan. 31.

Fifty-five companies have now been exempted by the FPC from regulation under terms of the Hinshaw Amendment to the Natural Gas Act.

Discovery of a well in northern Japan which is thought capable of producing 500 to 600 barrels per day was announced by Imperial Teikoku Oil Company, which is owned 50 percent by the Japanese government and 50 percent by Japanese private investors.

Richmond Oil Company and Texas Oil Company will explore for oil in Guatemala's Peten Province with the first permits granted U. S. firms under President Castillo's new oil law. A slight but significant rise in demand for oil country tubular goods, which normally account for 2 percent of steel shipments, at a time when rail, shipping and other major users are tightening demand leads steel industry to expect a further brightening of the industry's outlook for the next several months.

Texas Oil Stands Pat

The imports dispute once again was reflected in the action of the Texas Railroad Commission last month when it refused to cut the state oil allowable. Firm in its oft-repeated view that reduction of Texas output allows imports and other states a more-than-fair share of the market, the agency set a February production of 3,241,438 barrels a day with fields on a 16-day flow.

This production schedule will be down 38,327 barrels a day from January allowable but as near it as possible for the short month of February.

Apparently certain of its ground, the commission acted at the close of an 11-minute public hearing. All purchasers except Shell Oil Company, Sun Oil Company and The Atlantic Refining Company suggested cutbacks.

Thus, Texas allowable is the highest in history, except for November, 1952, when production was 150,000 barrels a day higher.

Meanwhile, Oklahoma is considering a law to raise that state's daily allowable to a minimum of 25 barrels per well. If passed by the legislature—and the measure is said to have the blessing of Governor Raymond Gary—the law would make it impossible to "circumvent" the minimum allowable by reducing the number of producing days per month or by any other means.

Until a few weeks ago, demand for Oklahoma oil was so weak that the State Conservation Commission was permitting minimum production of only 15 barrels a day per well. Shortly before his inauguration Jan. 10, Governor Gary supported pleas of independents before a Commission meeting that the allowable be raised to 20 barrels.

The state's conservation director said there was no market for the additional crude. But he was outvoted. The Commission ordered the 20-barrel minimum.

Pipe Line Investment Up

Investment in common carrier oil pipe lines rose 109 percent from 1946 to 1953 and by the end of the latter year amounted to more than $2.3 billion, the Interstate Commerce Commission reported last month.

ICC said the average ton-mile revenue for eight of the 11 large carriers engaged solely in transporting products was 0.519 cent in 1953. Total revenue of 78 carriers reporting in 1953 was $591.2 million, or 5.1 percent more than was reported by 75 carriers in 1952.

Carriers with annual revenues of $500,000 or more had a 4.3 percent increase in transportation revenues during the first half of 1954, compared with 1953.

the best way also happens to be the easiest way to start and stop a pig

Unibolt Scraper Trap Closures present a truly convenient and practical means for blanking off a line so that pigs may be easily inserted and removed from the trap. Release two bolts and the blanking plug swings open on a sturdy hinge. The scraper barrel being slightly larger than the pipe itself, the pig is easily inserted or removed. It is no longer necessary to "fight" the pig in and out of the trap. Swing the trap shut, tighten the bolts, and that's all. Let the pumps do the work. No heavy blind flanges to lift on or off. No multiple bolts to release and make up. Nothing to fall on the workmen. No leaky threads. An oil-resistant gasket seals automatically . . . seldom needs replacing.

UNIBOLT SCRAPER TRAP

with trouble-free, self-sealing gasket

THORNHILL CRAVER CO.
P. O. BOX 1184 HOUSTON, TEXAS

Pipe Line Men

IN THE NEWS

Harold Burrow

N. W. Freeman

R. C. Graham

C. A. Lingo

W. C. McGee

R. L. McVey

C. C. Johnson

W. D. Walser

R. L. Jones

W. W. Witmer

Stone Wells

S. C. Oliphant

R. R. Dean

Promotion of six vice presidents to senior vice presidents and election of seven new vice presidents to meet increasing administrative needs of the expanding Tennessee Gas Transmission Company have been announced.

Newly designated as senior vice presidents are **Harold Burrow, N. W. Freeman, R. C. Graham, C. A. Lingo, W. C. McGee, Jr.,** and **R. L. McVey.** All are veteran executives of Tennessee Gas.

New vice presidents elected by the board of directors are Treasurer **C. C. Johnson,** Controller **W. D. Walser,** Sales Manager **R. L. Jones,** Gas Contracts Manager **W. W. Witmer,** Administrative Assistant **Stone Wells,** and **S. C. Oliphant** and **R. R. Dean.** The latter two have been vice-presidents of the firm's oil and gas producing affiliate, Tennessee Production Company. The designation of Administrative Assistant **Charles S. Taylor** as general attorney was also announced.

•

F. M. Foster has been elected a vice president of **Southern California Gas Company.** He succeeds **W. M. Jacobs,** who was recently made vice president and assistant general manager.

With the gas company since 1936, Foster was made general sales manager in 1949, after serving in various supervisory positions in the Los Angeles and San Joaquin Valley divisions. In 1947 and again in 1952, he served as chairman of the Refrigeration Committee of the American Gas Association.

•

Ford, Bacon & Davis, Inc., engineers-constructors, have announced that **Charles C. Whittelsey** has been elected executive vice president. He will also continue as executive vice president of the firm's subsidiary, Ford, Bacon & Davis Construction Corporation, headquarters at Monroe, La.

William B. Poor succeeds Whittlelsey as vice president and manager of the Construction department. He has also been elected a director of the firm and a director of the construction corporation.

Whittelsey has had active charge of the engineering and construction of many of the large-scale projects handled by the firm. He joined Ford, Bacon and Davis in 1926 to work on construction of the Interstate Natural Gas Company's line from Monroe to New Orleans. Since that time, he has been continuously active in the firm's oil and gas work.

Before joining the firm in 1948, Poor was chief engineer of Tennessee Gas Transmission Company and, for many years, was associated with United Gas Pipe Line Company.

•

M. J. Casey has joined the general manager's staff of the new Supply and Transportation department of **Standard Oil Company (Indiana).** He will be supervisor-administrative, transferring from assistant supervisor

of labor relations in the general office Industrial Relations department.

Casey joined Standard in 1932 as an accounting clerk in the Indianapolis sales division. In 1953 he was named assistant supervisor of labor relations at the Chicago general office.

•

H. Carl Wolf, managing director of the American Gas Association since 1945, is relinquishing his position as active head of the association's staff, due to continued illness. He will be available to the association in the capacity of a consultant.

John W. West, Jr., who has been acting managing director since June, 1954, will continue in that capacity until a permanent appointment has been made.

•

L. B. McCammon, manager of the Products Distribution department of **The Ohio Oil Company,** retired December 1 after 24 years service. **M. D. King,** assistant manager of the Products Distribution department, will succeed him as manager.

McCammon's first assignment with Ohio Oil was vice president of the former Marathon Oil Company. Eight years later, in 1938, he was made manager of The Ohio Oil Company's marketing operations in Oklahoma and Kansas. When the company sold its marketing facilities in the mid-continent in 1939, he was transferred to Robinson, Ill., and appointed manager of the then newly-organized Refined Products Supply department. He was transferred to the general office, Findlay, in 1947.

King first worked for Ohio Oil as messenger in the general office in 1926 between school terms at Findlay College. His continuous employment began in 1931 as secretary in the Refining and Marketing department, Robinson, Ill.

After various moves, he was recalled to the general office in 1945 and named assistant to the manager of the Refining and Marketing department. He served in this post until January, 1954, when he was appointed assistant manager of the Products Distribution department.

Pump manufacturer *standardizes* on LATTICE BRAID* Packing for *all* centrifugal pump models

*Registered Trademark. *Only* Garlock makes LATTICE BRAID rod and shaft packings.

Peerless Pump Division, Food Machinery and Chemical Corporation, Los Angeles, manufactures an entire line of centrifugal pumps. Before changing to LATTICE BRAID, Peerless regularly received frequent complaints on packing from their customers. Now that Peerless has *standardized* on LATTICE BRAID, complaints are rare. In addition, Peerless reports that LATTICE BRAID *resists* the excessive gland pressure often applied by uninformed repairmen. The result is that there is *less* packing and sleeve wear.

Put Garlock LATTICE BRAID Packing to work for your company. All the braided strands of this unique packing are lattice linked together into one structural unit. The strands hold together even when the packing is worn far beyond the limits of wear of ordinary braided packings.

LATTICE BRAID is made from flax, cotton, asbestos, wire-inserted asbestos, Teflon, and asbestos with Teflon impregnation—for various types of services.

Get all the facts about LATTICE BRAID *Packings. Contact your Garlock representative or write for new folder AD-131.*

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In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK LATTICE BRAID PACKING

Appointment of **Charles S. Mitchell** as manager of all transportation facilities of Cities Service has been announced.

Associated with Cities Service for the last 25 years, Mitchell since 1950, has been manager of the crude oil supply and transportation division of the Cities Service Oil Company (Del.), with headquarters in Bartlesville, Okla. He is also president of Cities Service Pipe Line Company and an officer and director of several other subsidiary and affiliated companies of the Cities Service System.

In his new post, Mitchell will coordinate the marine, pipe line and other transportation activities, as well as crude oil purchases and sales, of the Cities Service system.

•

John M. Ballachey, formerly assistant to the president of the Canadian Petroleum Association, has been appointed executive assistant to the general manager of the **Alberta Gas Trunk Line Company, Ltd.**

E. J. Wacker has been named vice president of **Magnolia Pipe Line Company** in charge of the Engineering and Communications and Electrical departments. He joined Magnolia Pipe Line as mechanical engineer in March, 1939, and eight years later was made assistant chief mechanical engineer. Promoted to assistant division superintendent at Midland, Texas, 1951, he was returned to the company's general offices in Dallas in 1952.

E. J. Wacker

Magnolia Pipe Line Company has also announced that **Albert T. Pasche,** of the Enginering department in Dallas, has been transferred to **Socony-Vacuum Oil Company, Inc.,** in New York as chief pipe line engineer, producing department.

George A. Seymour has been promoted to senior mechanical engineer of Magnolia with headquarters in Dallas, and **J. S. Black, Jr.,** former district superintendent in Beaumont, has been transferred to Socony-Vacuum Oil Company of Canada, Ltd.

L. J. White, superintendent of the Houston District, has been transferred to Beaumont as district superintendent of the newly-created Houston-Beaumont district. **J. R. Dean,** chief gager of Magnolia Pipe Line's North Texas and Olden Districts, has been transferred as assistant district superintendent. The office was created when the district office in Houston was closed.

•

Jane E. Pfeifer, former assistant secretary and Gas Accounting department manager of **Texas Natural Gasoline Corporation,** has announced the opening of her office in Corpus Christi as gas measurement and gas accounting consultant. She is believed to be the only woman consultant in that particular phase of the natural gas industry.

She joined Warren Petroleum Corporation as a clerk in the Gas Accounting department in 1941. In 1948, she resigned to join the newly-organized Texas Natural. During the last six years she has been associated with contract purchasing of natural gas.

"How TOPAZ Solved My HOT TAPPING Problem!"

"I needed a stopple on a high-pressure natural gas line. We had never made a hot tap before, and to shut down would have been too expensive. I called in a TOPAZ sales engineer and told him my problem. He specified the necessary equipment, supervised the preparation, and made the hot tap for me. No expensive equipment, no shutdown, and no unnecessary risks. That's what I call COMPLETE SERVICE!"

• Whether your hot tapping problem involves steam, gas, water, products or chemical lines, the safe economical answer is COMPLETE SERVICE from TOPAZ.

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Henry L. Phillips

Henry L. Phillips chairman of the board of Sinclair Oil & Gas Company, crude oil producing subsidiary of Sinclair Oil Corporation, and vice president of the parent company, has retired from active executive duties. He will continue to serve as a director of Sinclair Oil Corporation, a position to which he was elected in 1942, and as a director of the producing company.

In 38 years of service with Sinclair, Phillips has held many executive posts. He joined the Tulsa, Okla., Legal department of Sinclair in 1916, two months after H. F. Sinclair founded the original Sinclair Oil & Refining Corporation.

Phillips headed all Sinclair pipe line operations, and in that capacity planned and supervised the building of the organization's first products pipe line from the refinery at Marcus Hook, Penn., to Baltimore, Washington, D. C., and later on through to Chicago. Under his supervision, the company built almost all of its present 3052 miles of products lines.

He also was one of the founders and the first president of the Platte Pipe Line Company, in which Sinclair has part interest.

•

An information program designed to present facts to the public on the development of adequate resources of natural gas and oil will be conducted by the newly-created **Natural Gas & Oil Resources Committee,** of which **L. F. McCollum,** president of Continental Oil Company, is chairman. **Paul Kayser,** president of El Paso Gas Company, is vice chairman. **Baird H. Markham,** former director of the American Petroleum Industries Committee, will serve as full-time director of the committee.

Purpose of the program will be to acquaint consumers and the public at large with the full story of the efforts to meet the rapidly rising demand for this form of fuel and energy.

HAMER BLINDS **FOOLPROOF SHUT-OFF**

chalks up substantial savings $

FOR PIPE LINE COMPANY

Oklahoma Mississippi River Products Line Inc., tank farm manifold at Drumright, Okla., employs a quantity of four different Hamer Line Blind Valves.

HAMER *Visible Shut-off* LINE BLIND VALVES

HAMER *Plug Valves*

Will not stick. Plug adjustment nut makes it easy to open or close valve yet assures positive control of the plug.

Contamination costs money. Preventing it means a healthy savings in both time and dollars. That's where Hamer Line Blinds excel. For example: Installed in Oklahoma Mississippi's Drumright, Oklahoma tank farm when it was constructed in 1951, Hamer Blinds have been on the job 24 hours a day providing a quick leakproof shut-off that's both positive and permanent. Net results—the company reports complete product segregation has resulted in substantial savings every year the blinds have been in operation.

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HAMER VALVES, INC.

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Representatives throughout the World

What's Happening

AMONG SERVICE AND SUPPLY MEN

Le Roi Names Permar Field Sales Manager

Le Roi Division of Westinghouse Air Brake Company in Milwaukee has named Don S. Permar to the newly-created post of field sales manager. He moves from his position as sales manager of stationary air compressors.

Don S. Permar

In 1945 Permar joined Westinghouse Air Brake as a pneumatic engineer, and in the fall of 1946, he became a special representative for the industrial products division. He will provide administrative liaison between the factory and field sales staffs headquartering in New York, Atlanta, Cleveland, Milwaukee, Tulsa and San Francisco.

Darling Valve Announces Sales Organization Changes

Leon A. Hoffmeister, sales engineer for Darling Valve & Manufacturing Company of Williamsport, Penn., has been transferred to the firm's New York office, where he will be responsible for sales engineering of metal products in New Jersey and Delaware. B. F. Marcin, formerly sales engineer for Darcova products in New York, has been transferred to Pittsburgh.

New on the Darling sales staff is Frank C. Zeis, formerly of the Missouri Construction & Machinery Company, who will handle sales of metal products in the St. Louis area. Lewis M. Poag, a new Darling valve representative, will handle sales of metal products in the Cincinnati area.

B. E. Engstrom, midwest sales manager for the company's broad metal products and Darcova lines of equipment will handle all sales activities from the new sales office in Chicago.

Gar Wood Appoints Brown Sales and Advertising Director

Gar Wood Industries, Inc., has appointed Leo M. Brown assistant to the director of sales and advertising.

His appointment follows his return to Gar Wood after working several months as Western sales manager for Galion Allsteel Body Company.

Brown formerly was sales manager of Gar Wood's St. Paul Hydraulic Hoist division. He has served the company in various sales capacities since 1949, when he was employed as a salesman for Gar Wood in the South Central States.

Pipeline Coating Names Hyde New Midwestern Distributor

Announcement of the appointment of Marshall Hyde as distributor in the Michigan area is made by Pipeline Coating & Engineering Company, Inc., and Plico, Inc.

Marshall Hyde

Formerly national distributor for a gas odorant firm, Hyde is a veteran of many years' experience in the corrosion field. He will be located in Port Huron, Mich.

Standard Pipeprotection, Inc. Doubles Yard Railway Facilities

Increased business and larger shipments from the mills have resulted in Standard Pipeprotection Inc., St, Louis, Mo., doubling the length of yard trackage. The track now in use will accommodate 25 carloads of pipe, which can be loaded or unloaded in a day, from or onto Spi's layout of skidways. Yard facilities also provide for rapid loading and unloading of trucks.

Eliminate Costly PARAFFIN Removal Methods with . . .

BrakeSol

HOLDS PARAFFIN IN SUSPENSION

from FORMATION to REFINERY

BRAKESOL is ECONOMICAL, prevents or removes Paraffin from the tubing, flow lines, tank bottoms and pipe lines. Effective on both asphalt and mixed base paraffin.

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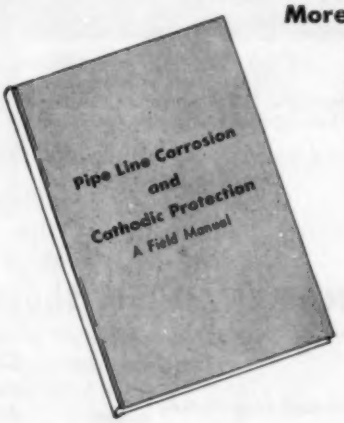
WRITE FOR FREE DESCRIPTIVE FOLDER

BRAKESOL, Inc.

P. O. Box 9506 Oklahoma City, Okla.

More comments on this new Handbook:

"... a most practical on-the-job manual for men concerned with pipe line corrosion. We are ordering copies for each of our district engineers."



Pipe Line Corrosion and Cathodic Protection

By MARSHALL E. PARKER

This Handbook, written by Marshall E. Parker, consultant, is designed as a practical field manual. It is a 108-page pocket-size volume printed first as a popular series in WORLD OIL. The Handbook is illustrated with many charts and drawings and is completely indexed by subjects.

It presents comprehensive data on Soil Resistivity Surveys, Potential Surveys, Line Currents, Current Requirements, Rectifier Systems, Ground Bed Design, Magnesium Anodes, Stray Current Electrolysis, Interference in Protective Systems, Operations and Maintenance, and Coating Protection and Testing.

An appendix has been added of technical data on Underground Corrosion, Basic Principles of Cathodic Protection, Properties of Metals and Attenuation Equations. Order copies of this practical Field Manual now for each of your field men. Price $3.

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William Firestone Named To New Motorola Post

Dr. William Firestone has recently been appointed to the newly created position of assistant chief engineer of the research department of Motorola's Communications and Electronics Division. He will also continue in his present position as head of the Advanced Investigation section of the Research department. This group is engaged primarily in VHF two-way radio research and pulse code development work.

William Firestone

"Oilwell" Names John Ahrens To Engineering Post at Casper

Promotion of John Herbert Ahrens to assistant district engineer, machinery and equipment sales and service, at Casper, Wyo., has been announced by U. S. Steel's Oil Well Supply Division.

Ahrens joined "Oilwell" in 1953 as a junior engineer at Casper, and, in 1954, was named field representative.

The Beryllium Corporation Opens Houston Sales Office

The Beryllium Corporation of Reading, Penn., announces the opening of a sales office in Houston. Ross E. Schofield, district representative in charge, will provide sales engineering services to users of the company's beryllium alloys in Texas and Louisiana.

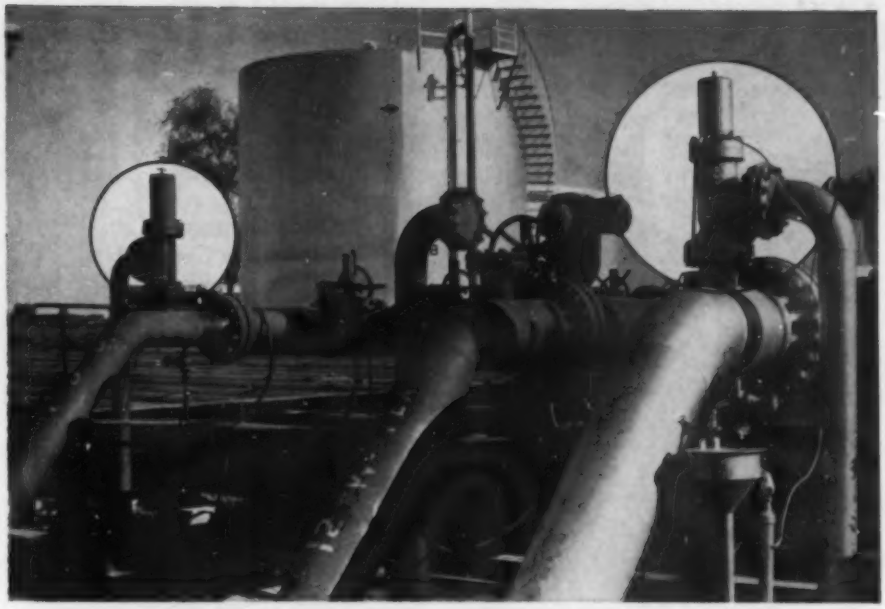
Safety tools will continue to be marketed through The Beryllium Corporation's established network of distributors in the area.

Southwestern Plastic Pipe Completes Expansion in January

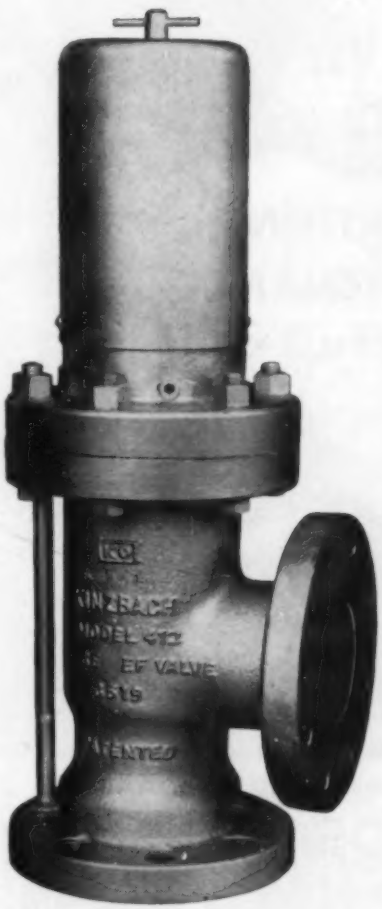
Expanded facilities for Southwestern Plastic Pipe Company, division of Texas Vitrified Pipe Company of Mineral Wells, Texas, were completed in early January. The new additions more than double Southwestern's manufacturing and warehousing facilities.

The additional space will enable the firm to maintain complete stocks of standard sizes in all types of Southwestern pipes.

"There's something about this job that reminds me of the infantry."



Positive Protection Against Pressure Surges



KINZBACH
MODEL 412
RELIEF VALVE
for Pipelines and Refineries

When a pressure overload in the line is reached, the Kinzbach Model 412 Relief Valve opens instantly to full capacity. This valve provides automatic resetting at a pre-determined pressure drop, positive seating and facilities for functional testing.

The Model 412 uses line pressure for opening and closing. The opening pressure is preset by application of a dead weight load. Opening and closing action is positive and reliable. The pre-set pressure never changes.

Kinzbach Model 412 Relief Valves are available in 2", 3", 4", 6" and 8" sizes for working pressures up to 1000 p.s.i. Write for Bulletin RV412 for full technical data.

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KINZBACH TOOL COMPANY, INC.

P. O. Box 277 Houston, Texas

Export Office: 74 Trinity Place, New York, N. Y.

For more data on advertised products, use Readers' Service Cards, last page.

Thew Appoints Brekelbaum Assistant To General Manager

E. C. Brekelbaum has been appointed assistant to the general manager of The Thew Shovel Company, Lorain, Ohio. He will have general authority on matters pertaining to methods, engineering and quality control covering the company's line of Lorain power shovels and cranes.

Brekelbaum joined Thew in 1952 as director of methods after 17 years with Harnischfegar Corporation of Milwaukee.

E. C. Brekelbaum

Sayre to Head Research Section Barrett Division, Allied Chemical

Barrett Division, Allied Chemical & Dye Corporation, has appointed James E. Sayre manager, Marketing Research department. A Barrett economist since 1939, Sayre is known for economic studies on coal chemicals published in various chemical journals.

Brakesol Transfers Cranford To Rocky Mountain Territory

Buford Cranford, sales engineer for Brakesol, Inc. of Oklahoma City, has been transferred to the Rocky Mountain territory. Headquarters will be in Casper, Wyo.

Cranford, formerly at Fort Morgan, had worked in the Oklahoma territory for several years.

H. J. Nave

K. C. Roesch

Nave and Roesch Promoted By White Motor Company

Henry J. Nave, director of service, has been elected president of The White Motor Company of Canada, Limited. He will succeed L. M. Hart who will continue as director of the Canadian subsidiary.

Karl A. Roesch, assistant to the vice president in charge of sales, was named to succeed Nave as director of service.

Nave was with Firestone Tire & Rubber Company in Akron, Ohio, for ten years before resigning in 1946 to become president and part owner of an automotive parts jobbing company in Framingham, Mass. He joined White Motor Company as service sales manager in 1950, and, in December of that year, was appointed director of service.

Roesch joined White in 1928 and became manager of the Cleveland branch in 1942. In 1950 he was named assistant wholesale manager; in 1951, general manager of the White coach and aircraft division; and early this year, assistant to the vice president in charge of sales.

Sears & Company To Join Hammond Iron in New Firm

A tentative agreement has been made by Hammond Iron Works of Warren, Penn., and Henry Sears & Company of New York to form a new company to carry on and expand present business, products and facilities of Hammond Iron Works.

The company, to be built around Hammond personnel, organization and facilities, will provide greater service to general industry, particularly in the petrochemical, processing, water works and utilities fields.

Jones & Laughlin Steel Opens Supply Store in Manitoba

A new store in Canada, at Virden, Manitoba, is announced by Jones & Laughlin Steel Corporation, Supply division. It is the latest of a total of five J & L oil country supply stores in the Canadian dominions of Alberta, Saskatchewan and Manitoba.

Lloyd R. Elston, manager of the store, is assisted by storeman William Kotyk and salesman H. Carl King whose headquarters are in Regina, Saskatchewan.

Industrial Agencies Named De Laval Representative

De Laval Steam Turbine Company, Trenton, N.J., has announced the appointment of Industrial Agencies, Ltd. as its exclusive representative in the Island of Trinidad and Tobago. They will handle De Laval centrifugal pumps, steam turbines, IMO pumps and other De Laval products.

PUT YOUR
CORROSION PROBLEMS
SURVEYING
ENGINEERING
INSTALLATION
MAINTENANCE
IN
OUR HANDS
Our business is corrosion control . . . in gas distribution systems . . . pipe lines . . . tank bottoms . . . flow lines . . . oil well casings . . . heater treaters . . . marine installations. Wherever there is a profit loss due to corrosion, Pipe Line Anode Corporation offers you experienced engineering service with the ability to integrate our services with any cathodic protection problem you have.

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Edmonton, Alberta

Pipeline Supply Company
912 West 11th
Houston, Texas

ANODE SPECIALISTS
AN·SPEC

L. E. MacDonald

R. P. Brooks

Two Receive Appointments At Bucyrus-Erie Company

Lawrence E. MacDonald has been appointed general sales manager for Bucyrus-Erie Company, South Milwaukee, Wis., taking over responsibility for all domestic sales.

He has been with the company over 28 years, serving as sales manager, excavator distributors, since 1949. Before that he was sales representative and manager of various sales and districts.

Robert P. Brooks has been appointed northwestern sales manager with responsibility for all product sales in Washington, Oregon, Idaho and Montana, Alaska, the provinces of British Columbia and Alberta, and the Yukon Territory. His headquarters will be in the Seattle district sales office.

Brooks joined the company under a special apprenticeship in 1946, and later was assigned to the Seattle office as a small shovel sales representative. He has held this position until this recent appointment.

Bondactor Manufacturers Expand Distribution Program

The Air Placement Equipment Company, of Kansas City, Mo., manufacturers of Bondactor equipment, have announced a new expansion program for product distribution and sales. Until now, principal products of the company have been primarily available directly from the company and from only a few selected distributors. The new program will involve the establishment of additional dealer-distributorships in certain territories on a franchise basis. All sales will be made through these regularly established construction and industrial equipment distributors.

Le Roi Names Paul Sullivan Assistant Sales Manager

Paul D. Sullivan, formerly in charge of contractor sales in New York, has been named assistant sales manager of Le Roi Division, Westinghouse Air Brake Company. His headquarters will be in Milwaukee.

P. D. Sullivan

Sullivan joined Clyde Equipment Company in Oregon as construction machinery sales representative in 1936. In 1940 he became a resident field engineer in Oregon and southern Washington for the Gardner-Denver Company, and, in 1947, special representative in charge of large engineering projects in the Midwest and East. He joined Le Roi in 1953.

Why you cut more pipe more easily with RIDGID Heavy-Duty Pipe Cutters

Extra easy to use—beautifully balanced, you work with least effort . . . high alloy thin blade or heavy-duty cutting wheels roll right thru any pipe, almost burrless cuts . . . perfect tracking.

Extra long service—special malleable housings guaranteed not to warp or break . . . every cutter individually tested before shipment, all 6 sizes—⅛" to 6"; 4-wheel cutters to 4".

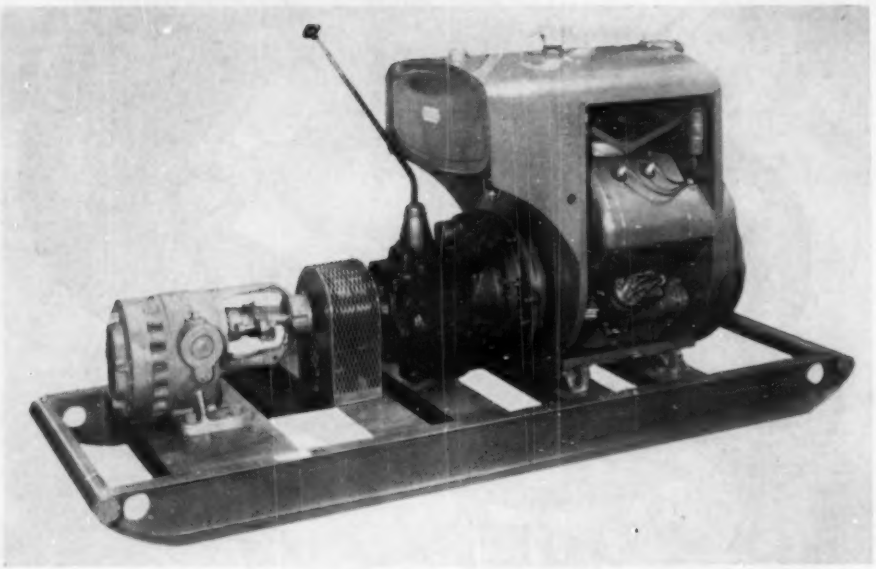
For most for your money, buy RIDGID . . . Your local Supply House stocks them for you, gets them to you fast as you need them.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO, U. S. A.

RIDGID Work-Saver Pipe Tools

What's New in Equipment

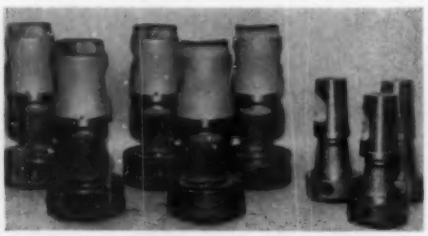
for the Pipe Line Industry



Rotary Pump

This variable speed rotary pump for pipe line scrapers or pigs will force them through the pipe lines under conditions which vary greatly. The machine, manufactured by Harley Sales Company, is a Model VG4D (36 horsepower) Wisconsin air-cooled, heavy-duty engine connected to a high pressure Roper rotary pump through an industrial transmission with three forward speeds and a reverse. The capacity varies from 15 barrels per hour at 1000 pounds to 65 barrels per hour at 400 pounds. The unit has many other uses and applications. In one fabrication, it is built for portable use and gives a wide variation of pumping capacities with oils in a wide range of viscosities.

For more data, circle **No. E1** on Readers' Service Card, last page this issue.



Spray Coating Process

Service life of plug-type line valves is being prolonged by reclaiming with a Spraywelded Colmonoy hard-facing alloy at Hamer Valves, Inc. These valves control fluid flow in all types of pipe lines.

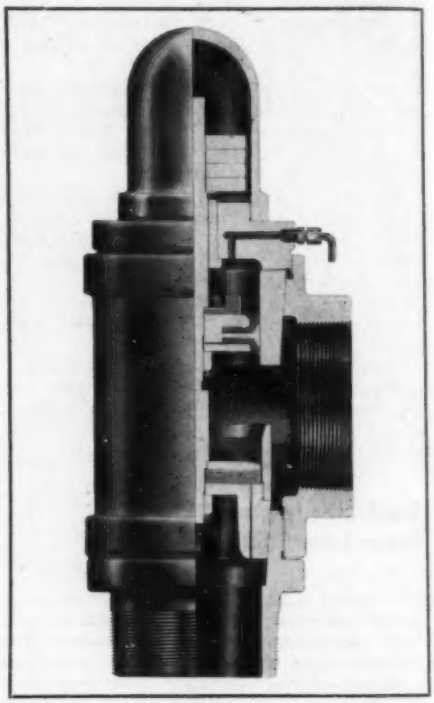
Use of the Colmonoy Sprayweld process on the valve plug provides three advantages in the reclaiming of Hamer valves: (1) warpage is not a problem so there is no need for overlaying the plug neck packing area as required in the conventional procedure; (2) rough machining before finish grinding is no longer necessary; and (3) the extra steps required for application of hard-chrome plating are avoided.

In the new process, the valve body seating surface is arc-welded and ground oversize. In reclaiming the plug, the original chrome plated tapered seating surface is first removed. Where necessary, cavities and surface imperfections are electric arc-welded and rough machined. The surface to be Spraywelded is then grit blasted, acid dipped, soda dipped, steam cleaned and air-blast dried to provide a surface that will insure positive mechanical bonding of the sprayed deposit to prevent its lifting during fusing.

The plug is mounted between centers on a small lathe and rotated; Colmonoy No. 4 powder is applied with a Spraywelder pistol unit. Overlay thickness depends upon the oversize conditions of the rebuilt valve body.

While still rotating between centers on the lathe, the plug is heated with the flame of an oxy-acetylene torch to a surface temperature of approximately 1900° F, just enough to fuse the overlay but not enough to cause warpage. The result is a fusion-bonded non-porous welded overlay that is high in abrasion, corrosion and impact resistance. The coated plug is then finished ground to match the valve body.

For more data, circle **No. E2** on Readers' Service Card, last page this issue.



Automatic Shut Off Valve

The L-K automatic shutoff and back pressure valve fills a need for a positive automatic shutoff valve. This shutoff feature also combines with it a positive back pressure check valve. In operation it is set on the flow line a short distance from the tank or battery it is to serve. Weights applied to the valve offset the static pressure of the oil within the tank so that when the oil in the tank reaches a predetermined level where the static weight of the oil flowing through the valve is less than the weight on the valve, the weight closes the valve. A piston working inside a cyclinder above the valve and having an extension resting on top of the valve serves the purpose of balancing the vacuum on the downstream side, the downward pull of the vacuum on the piston and the upward pull on the valve offsetting each other. This permits the differential weight bearing down on top of the valve through the piston to close the valve, when the pressure from the tank becomes less than this weight. As this valve is closed, it immediately becomes a back pressure valve.

Manufactured by the L-K Pump Valve Company, this valve does not restrict the

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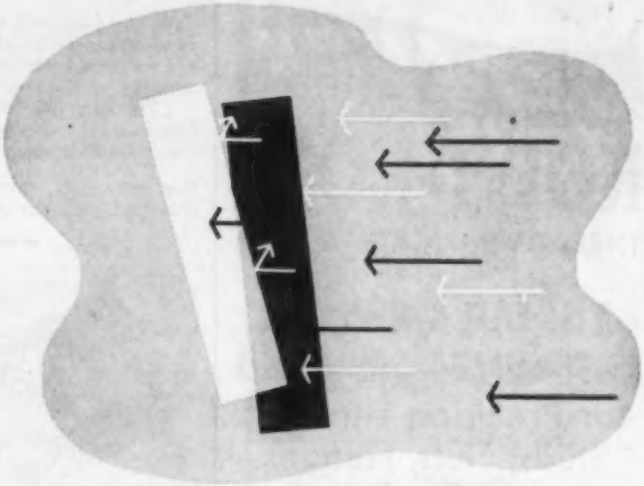

Radioisotope Laboratory For Oil Industry Opened in Houston!

A radioisotope laboratory solely for supplying the petroleum industry with special tagged compounds has been opened in Houston at 2419 South Boulevard by Tracerlab, Inc. The laboratory will stock and ship on 24-hour notice all the short lived isotopes and standard tagged chemicals now being extensively used, and will thus overcome present serious delivery problems.

Tracerlab has been supplying compounds to oil companies for several years from its Boston, Massachusetts and Richmond, California laboratories. The growing volume of orders has made it practical to establish a special laboratory in a location more convenient for the majority of users.

Many standard compounds utilized by the oil industry are to be packaged and sold under the firm's trade names: TraceSols, which are radioisotope solutions or volatile or gaseous compounds; and TraceOids, which are radioactive isotopes in the form of particulates. These compounds can be shipped on 24-hour notice or less, if the ordering firm's general authorization from the Atomic Energy Commission is on file.

Descriptive sheets on TraceSols and TraceOids, complete with specifications, prices and illustrations of some of the applications, are available on request.

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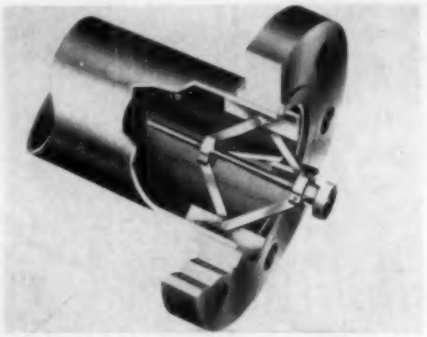
flow, the four-inch valve having an orifice of seven square inches. The four-inch standard valve is built for 300 pounds working pressure and is tested to 1000 pounds.

(This item supplements L-K Pump Valve Company data on pages 2870-2879 of the Composite Catalog, 20th Edition.)

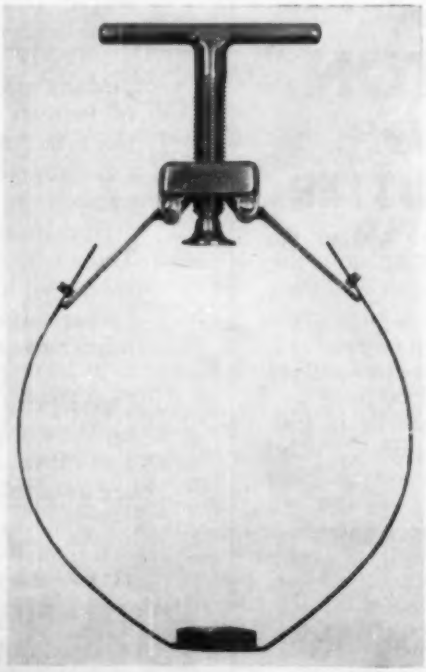
For more data, circle **No. E3** on Readers' Service Card, last page this issue.



Flange Aligning Tool

A new self-centering flange aligning tool designed to accommodate any pipe size from three inches to 12 inches is being marketed by the Contour Marker Corporation. The new device is slipped into the pipe and expanded to center itself snugly against the inside diameter, with the stepped shoulder members against the pipe's end face. Projecting shoulders are thereby automatically aligned with the pipe axis and, when the flange is held in position against these projecting shoulders, the flange can be quickly welded in perfect alignment without the time consuming methods ordinarily necessary.

For more data, circle **No. E4** on Readers' Service Card, last page this issue.



Plug and Clamp Assembly

The D. W. Moor Rubber Corporation, in collaboration with pipe line field engineers, has developed a new Neoprene rubber strap-on plug and clamp assembly especially designed to stop leaks before affixing and welding the shoe to damaged pipe lines. The Neoprene rubber plug is laminated to a perforated steel strap with a steel disc supporting the back of the plug. The pliable softness of the plug allows it to flow readily into all cavities, pits and cracks for a tight seal (even under extreme rust and corrosion conditions), yet is strong enough to withstand high pipe line pressures.

The clamp applies the plug to the leak in seconds. The holes in the strap fit over pins on the clamp; the clamp is tightened, and the plug seals the leak. The clamp is easily removed after the pipe shoe is welded in place. Plugs come with straps 24 inches long for pipes eight inches or less in diameter, 36 inches long for pipes up to 12 inches in diameter.

For more data, circle **No. E5** on Readers' Service Card, last page this issue.

Hand Driven Centrifuge

A new model, hand driven centrifuge for determining basic sediment and water in crude oil has been announced by W. H. Curtin & Company. Known as the Series 53, the new centrifuge has a weight reduction of approximately one-third gained through the use of aluminum castings.

The new Series 53 model has shipping weight of slightly under seven pounds (net weight of 5½ pounds; old model had net weight of around 8½ pounds).

The new model "Series 53" embodies the following principal improvements. (1) Body, crank spindle nut and guard, identical on both cc and 100 cc models; so user may have the advantage of two machines in one, just by changing heads. (2) Spindle nut, for retaining head on shaft, has left hand thread to prevent danger of backing-off when machine is in use. (3) Drive shaft and pinion shaft, to assure long-life, are stainless steel, corrosion resistant.

For more data, circle **No. E6** on Readers' Service Card, last page this issue.

New Equipment Literature

Coupling Units

Two new 8½ by 11-inch data sheets describing Morflex industrial engine flywheel flexible coupling units are now available from Morse Chain Company. These sheets illustrate and list specifications for standard units that will fit eight models of Chrysler industrial engines and twenty-nine models of Ford industrial engines.

The units include a long-life, torsionally flexible, shock-resistant, weatherproof standard Morflex coupling and a balanced cast iron adapter plate that bolts to the engine flywheel through the clutch bolt circle holes. The units are sold with the adapter plate drilled to suit the particular engine model and no drilling or matching is required by the customer.

To get a copy, circle **No. E7** on Readers' Service Card, last page this issue.

Combustion Gas Turbines

General Electric Company's combustion gas turbines for power generation and mechanical drive are described in a revised bulletin. Gas turbine-steam turbine cycles, mechanical drive applications, design features, control and governing, generators; and tables of characteristics and dimensions and weights are among the subjects covered. Models included are the simple-cycle, single-shaft; simple-cycle, two-shaft; and the regenerative-cycle, two-shaft units.

To get a copy, circle **No. E8** on Readers' Service Card, last page this issue.

Plastic Pipe Lines

A new bulletin, "Plastic Pipelines for the Petroleum Industry has been released by Petro-Plastic Engineering Inc. Four basic types of extruded plastic pipe are described and applications for various types discussed. There is a general introduction on the use of plastics.

To get a copy, circle **No. E9** on Readers' Service Card, last page this issue.

V-8 Engines

Le Roi Division of Westinghouse Air Brake Company has released a new bulletin describing and illustrating the 225 to 675 horsepower Le Roi L3460 and L4000 engines. Cutaway views and studio photos show the advanced design features such as the integral V-12 cylinder block design, the counter balanced crankshaft and hydraulic valve lifters and other features of these engines. Charts showing the space savings of the integral V-12 design and the horsepower ratings at varying revolutions per minute with LPG fuel and gasoline or natural gas fuel are also included. The literature shows how these engines are widely used in the petroleum industry for drilling, pipe line and generator applications. Basic specifications for the engines are also included in the bulletin.

To get a copy circle **No. E10** on Readers' Service Card, last page this issue.

Corrosion Prevention Book

Detailed information on the use of sodium nitrite as an inexpensive and efficient rust and corrosion inhibitor is presented in a new booklet offered by the Solvay Process Division of Allied Chemicals & Dye Corporation. Entitled "Sodium Nitrite for Rust and Corrosion Prevention," the booklet covers the use of the product alone to protect metal surfaces, primarily iron and steel, or combinations of sodium nitrite with such materials as caustic soda or phosphates for dual purpose applications.

The text of the booklet, fully illustrated to show commercial applications, describes how sodium nitrite protects against rust and corrosion; the use of sodium nitrite in combinations with other materials; specific applications; means of testing working solutions; and how to handle and store the product. An extensive bibliography is included to provide additional sources of information on the many and diverse applications of sodium nitrite in the corrosion field. Copies may be obtained without charge.

To get a copy, circle **No. E11** on Readers' Service Card, last page this issue.

New slant on Shut-off Valves

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Quality mechanism encased in cast aluminum give our users that sure feeling of making the right choice.

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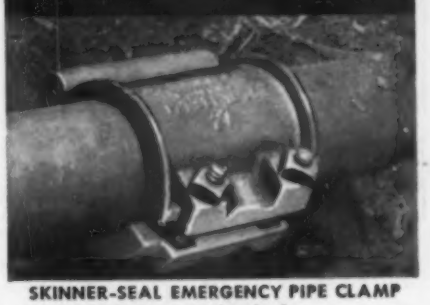

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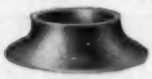

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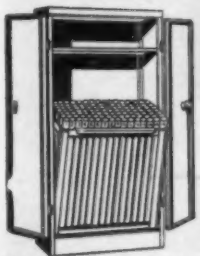

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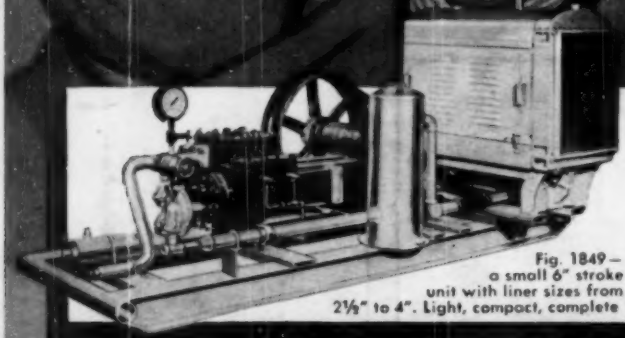

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